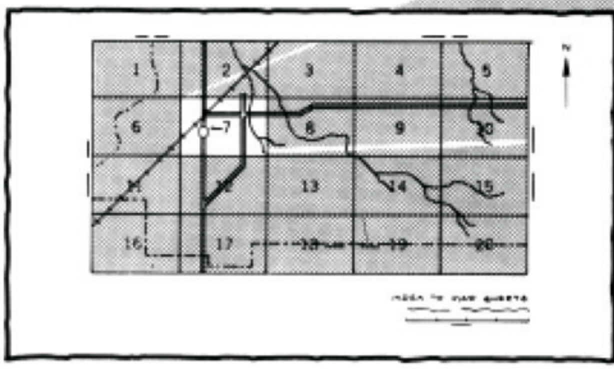
SOIL SURVEY OF

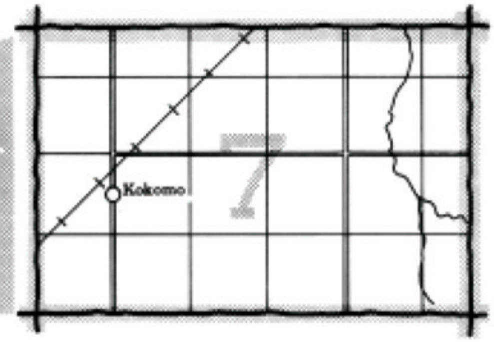
Jackson County, Illinois

United States Department of Agriculture
Soil Conservation Service and Forest Service
In cooperation with
Illinois Agricultural Experiment Station

HOW TO USE

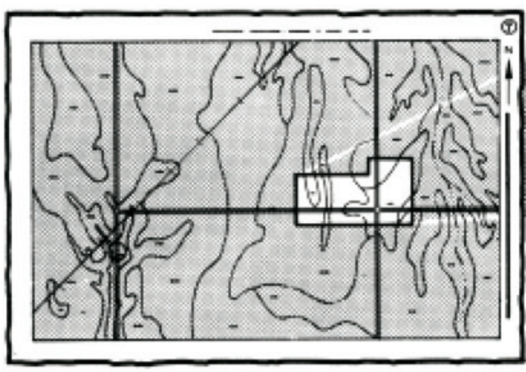
1. Locate your area of interest on the ''Index to Map Sheets''

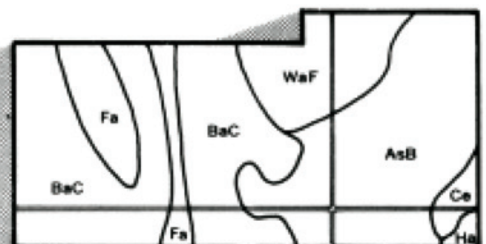




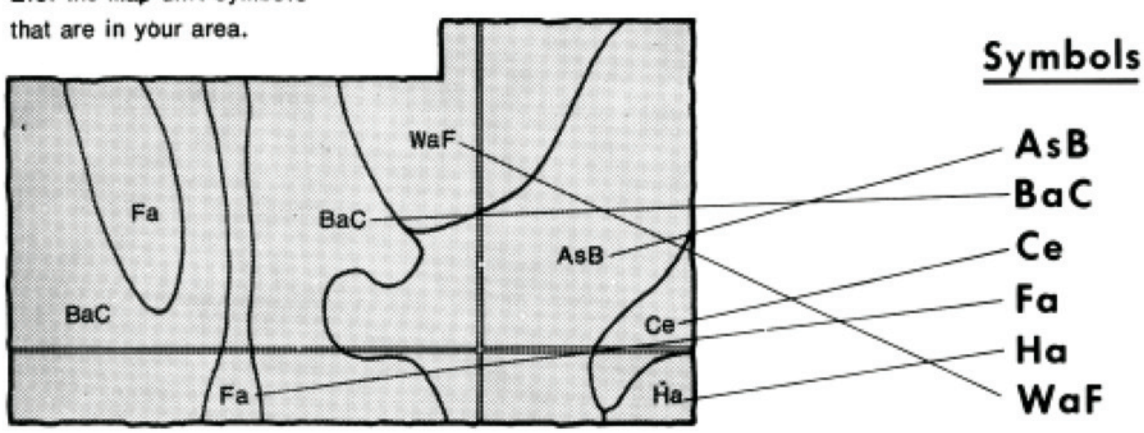
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



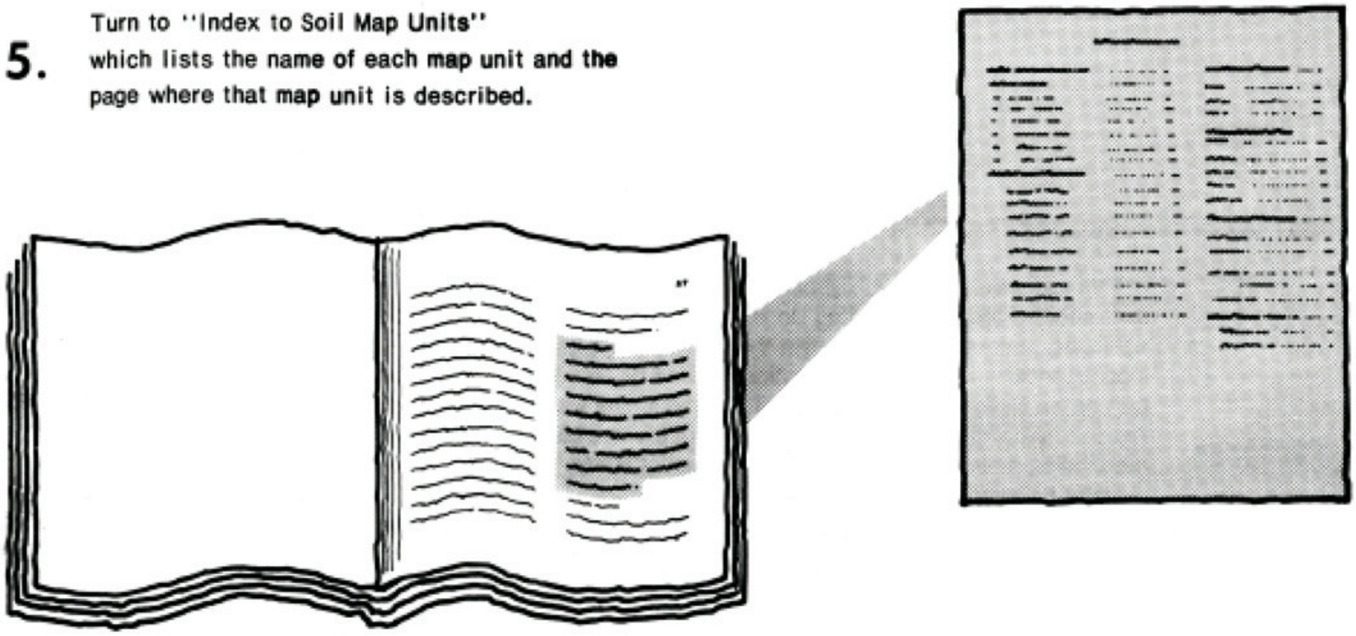


4. List the map unit symbols that are in your area.

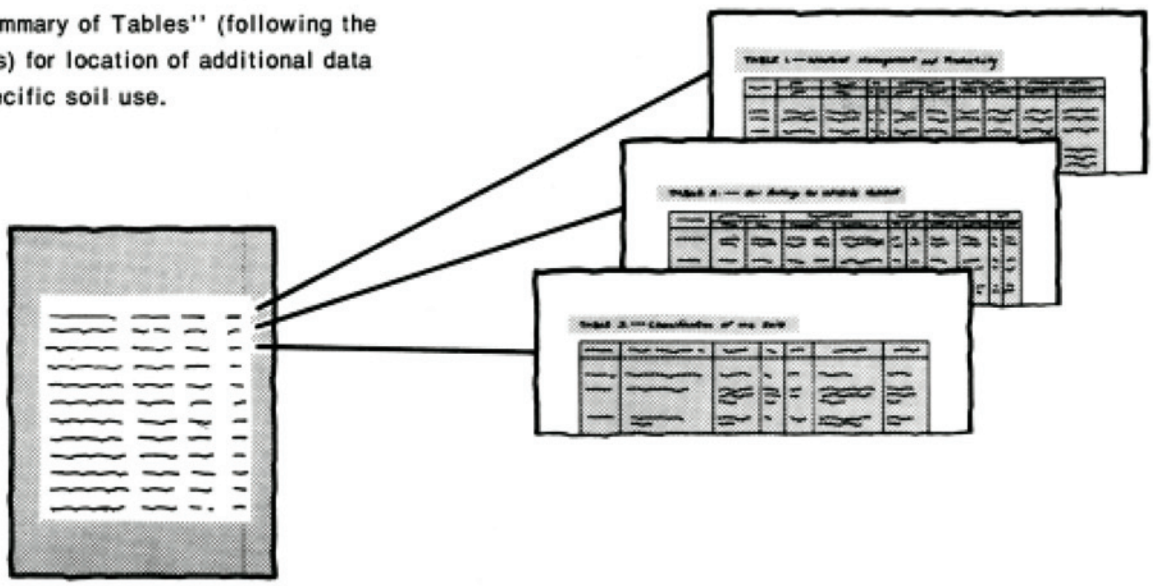


THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and state agencies, usually the Agricultural Experiment Stations. In some surveys, other federal and local agencies also contribute. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1969-74. Soil names and descriptions were approved in 1975. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1975. This survey was made cooperatively by the Soil Conservation Service, the Forest Service, and the Illinois Agricultural Experiment Station. It is part of the technical assistance furnished to the Jackson County Soil and Water Conservation District. The cost was shared by the Jackson County Board of Supervisors.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

This soil survey is Illinois Agricultural Experiment Station soil report number 106.

Cover: Grassed waterways help remove runoff safely and protect this area of strongly sloping Ava and Hickory soils from erosion, which is the major problem on about two-thirds of the cropland and pastureland in the county.

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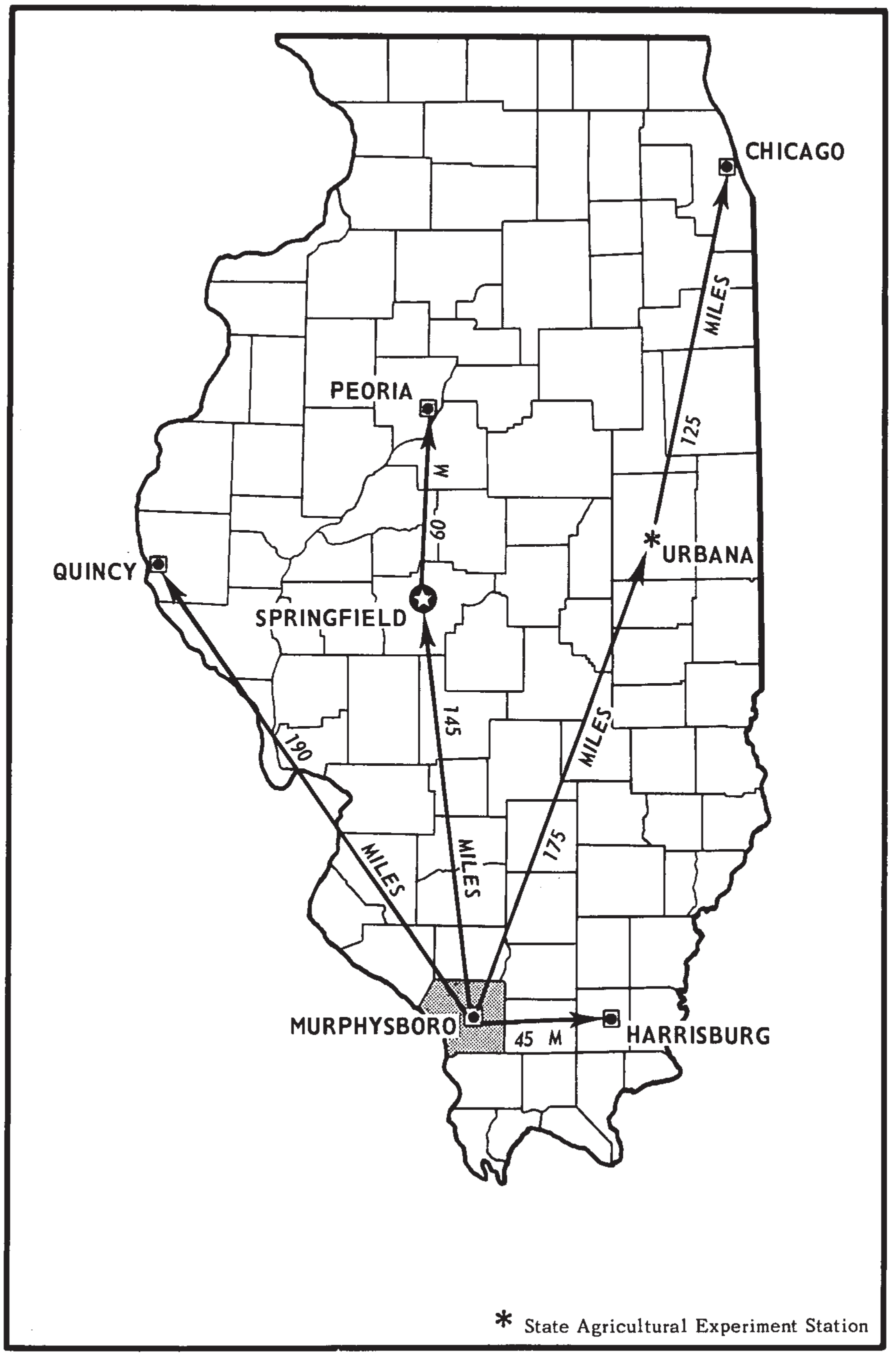

Location of Jackson County in Illinois.

SOIL SURVEY OF JACKSON COUNTY, ILLINOIS

By R. J. Herman, assisted by C. C. Miles, L. A. Dungan, B. E. Currie, and P. W. Ice, Soil Conservation Service

Soils surveyed by B. E. Currie, L. A. Dungan, R. J. Herman, C. C. Miles, and W. D. Parks, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service and Forest Service, in cooperation with Illinois Agricultural Experiment Station

General Nature of the County

PAUL W. ICE, District Conservationist, Soil Conservation Service, helped prepare this section.

This section gives general information about Jackson County. It describes the history and development of the county, the farming and industry, and the relief and climate.

History and Development

Jackson County, named for Andrew Jackson, is located along the Mississippi River in southern Illinois. It comprises about 605 square miles, or 387,200 acres.

Because it is on the banks of the Mississippi River and near the confluence of the Big Muddy River, Grand Tower was one of the first areas in the county to be settled.

In 1807, 24 families were settled in what is now Jackson County. These settlers were farmers, and they hunted and fished. By 1810, coal was being mined near the banks of the Big Muddy River, and by 1814, salt was being manufactured from salt springs along the river.

On January 10, 1816, Jackson County was formed out of Randolph County. When Illinois became a state in 1818, Jackson County was one of 15 counties in the new state.

Brownsville was the county seat until 1843. In that year, Murphysboro, about 3 miles east of Brownsville, became the county seat.

The construction of the Illinois Central Railroad in the mid-1850's helped to establish Carbondale, DeSoto, Elkville, and Makanda. The railroad benefited the coal industry and helped to develop iron furnaces north of Grand Tower. Small towns began to spring up over much of the county; most of these were coal mining and farming communities (*4*).

The center of activity shifted to Carbondale after the Second World War in response to the rapid growth of Southern Illinois University, which was established in 1869. Today, the field of education provides the greatest source of employment in the county.

At present there are eleven incorporated towns in the county. Carbondale and Murphysboro, with populations of 22,816 and 10,013, are the two largest towns. The 1970 census showed a total county population of 55,008 (*5*).

Transportation facilities in the county include six state highways, one U.S. highway, two major railroads, and the Southern Illinois Airport, which is between Carbondale and Murphysboro.

The county's economy is well distributed among agriculture, education, government, and industry. With the exception of educational services, wholesale-retail trade is the principal nonagricultural activity.

Mineral resources include coal, limestone, sand, and gravel. Jackson County has about 712,794,000 tons of coal reserves, of which 392,036,700 tons can be strip mined (*3*).

About three-fourths of the land is used for farming. Various farm products are grown in the county; the principal grain crops are soybeans, corn, and wheat. On the rolling hills, large amounts of forage are produced for beef and dairy cattle. Jackson County ranks second in the state in apple and peach production. Small fruits, vegetables, and nuts are also commercially grown.

Timber is an important resource in Jackson County. About 113,000 acres of timber is under private ownership (*9*), and most of the 40,000 acres of the Shawnee National Forest is woodland.

Two reservoirs, Kinkaid Lake, west of Murphysboro, and Cedar Lake, southwest of Carbondale, provide an abundance of high quality water for the county.

Recreation facilities are one of the county's greatest assets for economic growth. There are many scenic and historic spots, areas for excellent year-round hunting and fishing, and many hiking trails. Boating, swimming, and other water sports are big attractions throughout spring, summer, and fall.

Relief, Physiography, and Drainage

Three distinctive topographic regions can be defined in Jackson County. The elevation ranges from 330 to 850 feet above sea level.

A wide, fertile flood plain lies between the Mississippi River and the rugged hilly area to the east. Bottom lands along the Mississippi and Big Muddy Rivers are nearly flat and are poorly drained and somewhat poorly drained. Levees along the Mississippi and Big Muddy Rivers protect this area from hazardous river floods, but flooding beyond the levees prevents cropping or damages crops in some years.

Adjacent to the flood plains are rocky bluffs and rough hills that are nearly vertical and occasionally rise more than 200 feet above the floor of the flood plain. These hills enter the northwestern corner of the county and form a band up to 8 miles wide as they approach diagonally to Murphysboro. South of Murphysboro they expand to fill nearly all the southeastern quarter of the county.

The northeastern quarter of the county is dominantly flat. Most of the area was forested, but a few prairie islands occur throughout this area. This area consists of upland "claypan" soils and terrace soils.

Jackson County drains into the Mississippi River through the Big Muddy River, whose main tributaries are the Little Muddy River and the Beaucoup, Kinkaid, Cedar, Crab Orchard, and Drury Creeks. The bottom lands along the Big Muddy River are generally poorly drained or somewhat poorly drained and are frequently flooded. A few areas are permanently swampy, but many of these have been drained in the past 10 years.

The natural drainage in the rolling to rough upland is well developed. Rapid runoff results in serious soil erosion and causes small streams to flood the bottom lands after heavy rains. The water soon drains, however, leaving stream channels dry most of the time.

Although the flat to undulating upland has drainage channels in all sections, it is not well drained. The land does not have sufficient slope for surface water to drain away, and the subsoil is too slowly pervious for water to drain through it.

Climate

Jackson County is cold in winter and hot in summer. Winter precipitation, frequently snow, results in a good accumulation of soil moisture by spring and minimizes drought during summer on most soils. Precipitation in a normal year generally is adequate for all crops that are adapted to the temperature and length of the growing season in the area.

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Carbondale, Illinois, for the period 1951 to 1974. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 36 degrees F, and the average daily minimum temperature is 26 degrees. The lowest temperature on record, which occurred at Carbondale on February 2, 1951, is 22 degrees below zero. In summer the average temperature is 77 degrees, and the average daily maximum temperature is 89 degrees. The highest recorded temperature, which occurred on July 12, 1966, is 106 degrees.

Growing degree days, shown in table 1, are equivalent to "heat units." Beginning in spring, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

Of the total annual precipitation, 23 inches, or 55 percent, usually falls during the period April through September, which includes the growing season for most crops. In 2 years out of 10, the April-September rainfall is less than 19 inches. The heaviest 1-day rainfall during the period of record was 5.77 inches at Carbondale on May 22, 1957. About 53 thunderstorms occur each year, and about 23 of these occur in summer.

Average seasonal snowfall is 12 inches. The greatest snow depth at any one time during the period of record was 12 inches. On the average, 6 days have at least 1 inch of snow on the ground, but the number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The percentage of possible sunshine is 75 percent in summer and 50 percent in winter. The prevailing direction of the wind is from the southwest. Average windspeed is highest, 11 miles per hour, in March.

Tornadoes and severe thunderstorms occur occasionally. These storms are usually local and of short duration and cause damage in a variable pattern.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material, which has been changed very little by leaching or by the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Soil series commonly are named for a town or geographic feature near the place where a soil of that series was first observed and mapped. Raddle and Hurst, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in characteristics.

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects their use. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Hosmer silt loam, 2 to 7 percent slopes, is one of several phases within the Hosmer series.

After a guide for classifying and naming the soils was worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, roads, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called soil mapping units. Some mapping units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Mapping units are discussed in the section "Soil Maps for Detailed Planning."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily useful to different groups of users, among them farmers, managers of rangeland and woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation.

General Soil Map for Broad Land Use Planning

CLIFFORD C. MILES, Soil Scientist, Soil Conservation Service, prepared this section.

The general soil map at the back of this publication shows, in color, the soil associations in the survey area. A soil association is a unique natural landscape that has a distinct pattern of soils and of relief and drainage features. It typically consists of one or more soils of major extent and some soils of minor extent. It is named for the major soils. The kinds of soil in one association can occur in other associations, but in a different pattern.

The map provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are generally suitable for certain kinds of farming or other land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The kinds of soils in any one association ordinarily differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

The soil associations in this survey area have been grouped into general kinds of landscapes for broad interpretative purposes. Each of the broad groups and the soil associations in the groups are described on the following pages.

Dominantly nearly level to gently sloping soils that formed in alluvium on flood plains

1. Belknap-Wakeland association

Somewhat poorly drained soils that formed in water-laid silty sediment on tributary flood plains

This association consists mainly of nearly level to very gently undulating soils on bottom lands along the main streams. It extends over approximately 12 percent, or 45,090 acres, of the county. About 26 percent of the association is Belknap soils, 25 percent is Wakeland soils, and 49 percent is minor soils (fig. 1).

Belknap and Wakeland soils are along streams and overflow channels on the bottom lands of the county. Belknap soils are generally on the broader or lower part of flood plains. Wakeland soils are on the upper part of the flood plains and on alluvial fans of local streams flowing out from the bluff area onto the Mississippi River bottom land.

Belknap soils have 0 to 2 percent slopes and are somewhat poorly drained. Typically, the surface layer is dark grayish brown and brown silt loam about 8 inches thick. The substratum to a depth of about 50 inches is strongly acid silt loam. It is mottled yellowish brown, grayish brown, and light brownish gray. Below this, it is light brownish gray and light gray silt loam that is firm and dense. Permeability is moderately slow to moderate, and the available water capacity is very high.

Wakeland soils have 0 to 2 percent slopes and are somewhat poorly drained. Typically, the surface layer is brown silt loam about 13 inches thick. The substratum to a depth of about 60 inches is slightly acid to neutral silt loam. It is mainly mottled brownish gray and light brownish gray. Permeability is moderate, and the available water capacity is very high.

Minor soils include Okaw, Bonnie, Banlic, and Piopolis soils. Okaw soils are clayey and occur on benches along the Big Muddy and Little Muddy Rivers and along Beaucoup Creek. Bonnie and Piopolis soils are poorly drained and formed in silt loam and silty clay loam alluvium. Banlic soils are similar to Belknap soils except that they have a fragipan in the lower part of the subsoil and occur mainly on slight rises in the flood plains.

Frequent flooding and seasonal wetness limit the use of the soils in this association. Most areas along the Big Muddy and Little Muddy Rivers and along Beaucoup Creek are wooded, but the higher, open areas of these soils are used for row crops. Soils along streams flowing north or west into the Big Muddy River are used for meadow, row crops, and woodland. Soils along the bluff areas west of the Big Muddy River are used for corn, soybeans, and wheat. If protected and drained, these soils are well suited to intensive cropping. Wetter areas are suitable for development of wetland wildlife habitat. Protection from overflow and drainage of low-lying areas are the main concerns of management.

2. Darwin-Medway-Cairo association

Very poorly drained to somewhat poorly drained soils that formed in water-laid clayey or loamy sediment on the flood plain of the Mississippi River

This association consists mainly of nearly level to sloping soils on broad flats, ridges, and knolls of the Mississippi River bottom land. It extends over approximately 8 percent, or 29,850 acres, of the county. About 34 percent of the association is Darwin soils, 17 percent is Medway soils, 15 percent is Cairo soils, and 34 percent is minor soils (fig. 2).

Darwin soils are on broad, nearly level areas or in depressions. Medway soils are on ridges or knolls along sloughs or overflow channels, and Cairo soils are on low ridges of intermediate terrain.

Darwin soils have 0 to 2 percent slopes and are very poorly drained or poorly drained. Typically, the surface layer is very dark gray silty clay about 11 inches thick. The subsoil is about 37 inches thick. It is mottled dark gray clay. The substratum to a depth of about 60 inches is dark gray silty clay. Permeability is very slow, and the available water capacity is moderate.

Medway soils have 0 to 6 percent slopes and are somewhat poorly drained. Typically, the surface layer is very dark brown silty clay loam about 17 inches thick. The subsoil is about 10 inches of dark brown heavy loam overlying 9 inches of mottled dark brown loam. The substratum to a depth of about 61 inches is mottled brown and pale brown very fine sandy loam. Permeability is moderate, and the available water capacity is high.

Cairo soils have 0 to 3 percent slopes and are poorly drained. Typically, the surface layer is very dark grayish brown heavy silty clay about 12 inches thick. The subsoil is about 33 inches thick. The upper part is mainly mottled grayish brown clay and dark grayish brown and dark yellowish brown silty clay. Below this is mainly grayish brown and dark yellowish brown heavy clay loam and loam. The substratum to a depth of about 60 inches is grayish brown loamy very fine sand. Permeability is very slow in the upper part of the subsoil and moderate in the lower part.

Minor soils include Ware, Karnak, Gorham, and Bowdre soils. Ware and Bowdre soils are on ridges and knolls, and Karnak soils are in depressions and on broad flats. Gorham soils are on low ridges on intermediate terrain.

Most areas of this association are used for growing corn, soybeans, grain sorghum, and wheat. These soils are suited to intensive cropping. Overflow from backwaters, drainage of low-lying soils, and tilth of clayey soils are the main concerns of management. Soils that are not protected by the levee are subject to flooding and to cutting and deposition.

3. Jacob-Booker association

Very poorly drained and poorly drained soils that formed in water-laid, acid clayey sediment on the flood plain of the Mississippi River

This association consists of nearly level to depressional soils on the Mississippi River bottom land just west of the Big Muddy River. The association extends over approximately 6 percent, or 23,100 acres, of the county. About 54 percent of the association is Jacob soils, 29 percent is Booker soils, and 17 percent is minor soils.

Jacob and Booker soils are on broad flats of the Mississippi River bottom land. Most areas of the Booker soils occur in the northwestern part of the association.

Jacob soils have 0 to 2 percent slopes and are very poorly drained or poorly drained. Typically, the surface layer is dark gray clay about 4 inches thick. The subsoil, about 46 inches thick, is gray clay underlain by olive gray clay. The substratum to a depth of about 60 inches is grayish brown clay. Permeability is very slow, and the available water capacity is moderate.

Booker soils have 0 to 2 percent slopes and are very poorly drained or poorly drained. Typically, the surface layer is very dark gray silty clay about 12 inches thick. The subsoil is about 39 inches of mottled, very dark gray clay. The substratum to a depth of about 75 inches is mottled, dark gray clay. Permeability is very slow, and the available water capacity is low or moderate.

Minor soils include Darwin, Karnak, and Cairo soils, which generally occur near the edges of the association or on slight rises.

Much of this association is wooded. Cultivated areas, mainly in the northern and western parts of the associa-

tion, are suited to soybeans or grain sorghum. The root system of most crop plants is restricted by the clayey, acid soil. Overflow from backwaters, drainage, fertility, and tilth are the main concerns of management. These soils are well suited to the development of wetland wildlife habitat.

Dominantly nearly level to moderately steep soils that formed in water-laid sediment on terraces

4. Hurst-Colp-St. Charles association

Somewhat poorly drained to well drained soils that formed in silty over clayey sediment or in silty sediment on terraces

This association consists mainly of nearly level to moderately steep soils on broad flats, ridges, and side slopes of terraces along the Big Muddy and Little Muddy Rivers and along Beaucoup Creek. It extends over approximately 14 percent, or 52,325 acres, of the county. About 28 percent of the association is Hurst soils, 26 percent is Colp soils, 14 percent is St. Charles soils, and 32 percent is minor soils (fig. 3).

Hurst soils are on the more level flats and upper side slopes, and Colp and St. Charles soils are on ridges and side slopes.

Hurst soils have slopes of 0 to 6 percent and are somewhat poorly drained. Typically, the surface layer is dark grayish brown silt loam about 10 inches thick. The subsurface layer is about 6 inches of light gray silt loam and 4 inches of light brownish gray silty clay loam. The subsoil, about 41 inches thick, is mainly mottled, brown silty clay and mottled, grayish brown heavy silty clay loam. The substratum to a depth of about 65 inches is grayish brown light silty clay. Permeability is very slow, and the available water capacity is moderate.

Colp soils have 0 to 20 percent slopes and are moderately well drained. Typically, the surface layer is about 7 inches of dark grayish brown silt loam. The subsurface layer is about 5 inches of light brownish gray silt loam. The subsoil is mainly mottled, yellowish brown silty clay that is underlain by light brownish gray silty clay to a depth of about 60 inches. Permeability is slow, and the available water capacity is moderate or high.

St. Charles soils have 2 to 7 percent slopes and are moderately well drained or well drained. Typically, the surface layer of a slightly eroded soil is about 7 inches of dark brown silt loam, and the subsurface layer is about 3 inches of dark yellowish brown silt loam. The subsoil is about 45 inches thick. It is mainly dark yellowish brown silty clay loam that is underlain by light brownish gray silty clay loam. The substratum to a depth of 67 inches is grayish brown silty clay loam. Permeability is moderate, and the available water capacity is high.

Minor soils include Okaw, Starks, Camden, Sexton, and Wakeland soils. Okaw soils are in broad, level areas associated with Hurst soils. Starks, Camden, and Sexton soils occur near terrace breaks along the Big Muddy and Little Muddy Rivers where sediments are more silty. Wakeland soils are on the narrow bottom lands that dissect the terraces.

Corn, soybeans, wheat, and some meadow are commonly grown on the soils of this association. Woodland is common on the steeper slopes and on some broad flats. St. Charles soils and the more silty soils are well suited to vegetables. Removing excess water from the nearly level areas and controlling erosion on the more sloping soils are the main concerns of management.

5. Alvin-Camden association

Well drained and moderately well drained soils that formed in sandy and silty sediment over loamy sediment on terraces

This association consists mainly of nearly level to moderately steep soils on plains, ridges, and side slopes of terraces along the Big Muddy River mainly between the towns of Murphysboro and DeSoto. It extends over approximately 2 percent, or 8,120 acres, of the county. About 54 percent of the association is Alvin soils, 27 percent is Camden soils, and 19 percent is minor soils.

Alvin and Camden soils are on similar landscapes, but Alvin soils generally occur nearer the terrace break.

Alvin soils have 1 to 25 percent slopes and are well drained or moderately well drained. Typically, the surface layer is dark brown very fine sandy loam about 7 inches thick. The subsurface layer is brown very fine sandy loam about 4 inches thick. The subsoil, about 38 inches thick, is mainly dark yellowish brown loam underlain by dark brown loam and fine sandy loam. The substratum to a depth of about 64 inches is yellowish brown and light yellowish brown fine sand. Permeability is moderate or moderately rapid, and the available water capacity is moderate.

Camden soils have 0 to 18 percent slopes and are well drained or moderately well drained. Typically, the surface layer of a slightly eroded area is dark brown silt loam about 9 inches thick. The subsoil, about 56 inches thick, is mainly strong brown silty clay loam over strong brown and yellowish brown fine sandy loam. The substratum to a depth of about 76 inches is strong brown and yellowish brown loamy fine sand. Permeability is moderate, and the available water capacity is high.

Minor soils include Starks, St. Charles, and Colp soils. Starks soils are in the more level areas, St. Charles soils are mainly farther back from the terrace break, and Colp soils are on lower side slopes where more clayey sediments occur.

Corn, soybeans, wheat, and some meadow are commonly grown. Much of this association is used for housing. The more level soils are well suited to vegetables. The substratum of the Alvin soils is a possible source of sand. Control of erosion on the more sloping soils is the main concern of management.

Dominantly nearly level to very steep soils that formed in loess, glacial drift, and material that weathered from bedrock on uplands

6. Bluford-Ava-Wynoose association

Moderately well drained to poorly drained soils that formed in loess or loess and loamy material on uplands

This association consists mainly of nearly level to strongly sloping soils on broad, flat to undulating ridges, knolls, and side slopes on uplands in the northern part of the county. It extends over approximately 5 percent, or 19,200 acres, of the county. About 34 percent of the association is Bluford soils, 19 percent is Ava soils, 17 percent is Wynoose soils, and 30 percent is minor soils (fig. 4).

Bluford and Wynoose soils are on the more level terrain of drainage divides or at the head of drainageways. Ava soils are on ridgetops, knolls, and side slopes.

Bluford soils have slopes of 0 to 7 percent and are somewhat poorly drained. Their surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer, about 10 inches thick, is brown and pale brown silt loam with yellowish brown mottles. The subsoil is about 54 inches thick. It is dark yellowish brown, brown, and grayish brown silty clay loam and silty clay in the upper part and mottled brown, firm silt loam in the lower part. Permeability is moderate to slow, and the available water capacity is moderate or high.

Ava soils have slopes of 2 to 18 percent and are moderately well drained. Their surface layer is dark brown silt loam about 7 inches thick. The subsoil is about 50 inches thick. The upper part is brownish yellow heavy silt loam about 13 inches thick. The lower part is mottled strong brown and yellowish brown silty clay loam that grades to heavy silt loam. The substratum to a depth of about 68 inches is mottled dark brown silt loam. Permeability is moderately slow in the upper part and very slow in the lower part. The available water capacity is moderate.

Wynoose soils have slopes of 0 to 2 percent and are poorly drained. Their surface layer is grayish brown silt loam about 5 inches thick. The subsurface layer is mottled light gray and light grayish brown silt loam about 9 inches thick. The subsoil is about 44 inches thick. It is mottled grayish brown silty clay in the upper 18 inches and is mottled grayish brown silty clay loam changing to mottled light brownish gray in the lower part. Permeability is very slow, and the available water capacity is moderate.

Minor soils include Hickory, Hoyleton, Racoon, and Belknap soils. Hickory soils occur on side slopes in complex patterns with the Ava soils. Hoyleton soils are similar to Bluford soils but have a dark surface layer. Racoon soils are in low-lying areas, and they have a surface layer 2 to 3 feet thick. Belknap soils are on the small bottom lands that dissect the uplands.

Soils of this association are used for growing corn, soybeans, grain sorghum, wheat, and meadow. Woodland is common on the steeper slopes and on the broader flats. Controlling erosion on the more sloping soils, draining the nearly level soils, improving fertility, and maintaining or improving tilth are the main concerns of management.

7. Hosmer association

Moderately well drained soils that formed in loess on uplands

This association consists mainly of gently to strongly sloping soils on undulating ridgetops and side slopes on uplands. It extends over approximately 26 percent, or 100,430 acres, of the county. About 54 percent of the association is Hosmer soils, and 46 percent is minor soils (fig. 5).

Hosmer soils are on gently sloping to sloping ridgetops and strongly sloping hillsides.

Hosmer soils have slopes of 2 to 18 percent and are moderately well drained. Their surface layer is brown silt loam about 9 inches thick. The subsoil is about 41 inches thick. The upper part is strong brown light silty clay loam that grades to mottled yellowish brown heavy silt loam. The lower part of the subsoil, which has a very firm, compact zone, is about 27 inches thick. It is mottled dark yellowish brown and yellowish brown silty clay loam that grades to mottled dark yellowish brown and pale brown silt loam. The substratum to a depth of about 67 inches is mottled yellowish brown, firm silt loam. Permeability is moderate in the upper part and very slow in the lower part. The available water capacity is moderate.

Minor soils include Hickory, Neotoma, Stoy, Wellston, Alford, Wakeland, and Banlic soils. Hickory soils formed in glacial drift and occur on side slopes. Stoy soils are on the more level terrain of drainage divides or at the head of drainageways. Wellston soils are on the steeper hillsides and formed in loess and in material that weathered from bedrock. Alford soils are on high knolls, narrow ridgetops, and steep hillsides. Alford soils lack the fragipan that is characteristic of Hosmer soils. Wakeland and Banlic soils formed in silty alluvium and are on flood plains.

Soils of this association are used for cultivated crops, hay, pasture, and woodland. Many residences are in this association. Controlling erosion, improving fertility, and maintaining surface tilth are the main concerns of management.

8. Hosmer-Wellston association

Moderately well drained and well drained soils that formed in loess or loess and material that weathered from bedrock on uplands

This association consists mainly of gently sloping to very steep soils in hilly terrain on uplands in the southeast corner of the county. It extends over approximately 2 percent, or 9,560 acres, of the county. About 56

percent of this association is Hosmer soils, 19 percent is Wellston soils, and 25 percent is minor soils.

Hosmer soils are on sloping ridgetops and strongly sloping hillsides. Wellston soils are on strongly sloping to very steep hillsides.

Hosmer soils have slopes of 2 to 18 percent and are moderately well drained. Their surface layer is brown silt loam about 9 inches thick. The subsoil is about 41 inches thick. The upper part is strong brown light silty clay loam that grades to mottled yellowish brown heavy silt loam. The lower part, which contains a very firm, compact zone, is mottled dark yellowish brown and yellowish brown silty clay loam that grades to mottled dark yellowish brown and pale brown silt loam. The substratum to a depth of about 67 inches is mottled yellowish brown, firm silt loam. Permeability is moderate in the upper part and very slow in the lower part. The available water capacity is moderate.

Wellston soils have slopes of 15 to 50 percent and are well drained. Their surface layer is dark grayish brown silt loam about 1 inch thick. The subsurface layer is yellowish brown silt loam about 5 inches thick. The subsoil is about 44 inches thick. The upper part is strong brown heavy silt loam that grades to silty clay loam, and the lower part is strong brown heavy silt loam that grades to heavy loam. Fractured sandstone and siltstone are at a depth of 50 inches. Permeability is moderate, and the available water capacity is high.

Minor soils include Alford, Neotoma, and Belknap soils. Alford soils are on knolls, narrow ridgetops, and steep hillsides. Neotoma soils formed in material that weathered from bedrock. They have a channery or stony loam surface layer and a cobbly clay loam subsoil. Belknap soils are on the narrow bottom lands that dissect the uplands.

The soils of this association are mainly used for meadow, woodland, and orchards. Grasses, forbs, and shrubs have replaced crops in a number of fields. Contrasting relief and wooded slopes are common. Control of erosion, steepness of slope, and stoniness are the main concerns of management.

9. Alford-Wellston association

Well drained soils that formed in loess or loess and material that weathered from bedrock on uplands

This association consists mainly of sloping to very steep soils on narrow ridgetops, side slopes, and hillsides along the bluff area adjacent to Mississippi River bottom lands and on Fountain Bluff. It extends over approximately 24 percent, or 93,835 acres, of the county. About 60 percent of the association is Alford soils, 14 percent is Wellston soils, and 26 percent is minor soils.

Alford soils are on ridgetops, side slopes, and hillsides, and Wellston soils are on hillsides. Slopes are generally long and dissected.

Alford soils have slopes of 2 to 50 percent and are well drained. Their surface layer is yellowish brown silt loam about 8 inches thick. The subsoil is 58 inches thick. The upper part is strong brown silty clay loam. The lower part is brown silty clay loam that grades to brown heavy silt loam. Permeability is moderate, and the available water capacity is high.

Wellston soils have slopes of 15 to 50 percent and are well drained. Their surface layer is dark grayish brown silt loam about 1 inch thick. The subsurface layer is yellowish brown silt loam about 5 inches thick. The subsoil is about 44 inches thick. The upper part is strong brown heavy silt loam that grades to silty clay loam. The lower part is strong brown heavy silt loam that grades to heavy loam. Fractured sandstone and siltstone are at a depth of about 50 inches. Permeability is moderate, and the available water capacity is high.

Minor soils include Neotoma, Hickory, Hosmer, Burnside, and Haymond soils. Neotoma soils formed in material that weathered from bedrock. They have a channery or stony loam surface layer and a cobbly clay loam subsoil. Hickory soils formed in glacial drift and are on some lower side slopes. Hosmer soils are mainly at the head of drainageways or on foot slopes where surface runoff tends to collect. Burnside and Haymond soils are on the narrow bottom lands, which dissect the uplands. Also in this association are rock outcrops, which occur as narrow belts of boulders, ledges, or escarpments.

Soils of this association are used mainly for woodland or meadow. Orchards and vegetable crops are grown in some areas. Grasses, forbs, and shrubs are growing on some previously cropped fields. Contrasting relief, wooded slopes, and rock formations are common. Many high linear ridgetops have scenic views. Controlling erosion and reducing sediment are the main concerns of management. Steep slopes and stoniness are major limitations.

10. Orthents association

Well drained soils that formed in loamy material on strip-mine spoil banks

This association consists of disturbed soils and bedrock in spoil banks on strip-mine land. The spoil banks are mainly a series of rugged ridges and narrow depressions that extend over approximately 1 percent, or 5,690 acres, of the county. This association is in a belt west of State Route 51 and between the towns of DeSoto and Elkville. About 85 percent of this association is Orthents, and 15 percent is water, mine dumps, and small areas of undisturbed soils (fig. 6).

Orthents are gently sloping to very steep soils on ridges and side slopes and in narrow depressions of spoil banks. In some areas the ridge peaks have been struck off and partly leveled, and a few areas of recent strips have been leveled to grade.

Orthents have slopes of 2 to 70 percent and are well drained. Typically, this soil material consists of brown stony loam mottled with gray in the upper 60 inches. Permeability is moderate, and the available water capacity is moderate.

Many of the larger depressions and trenches have filled with water and formed ponds or lakes. Waste material separated from coal has been piled into several mine dumps. Small areas of undisturbed soil are enclosed by the spoil banks.

Most areas of this association are idle and have sparse vegetation of grasses, forbs, and shrubs. The vegetation is generally inadequate for food, nesting, and escape cover for wildlife. A few areas are in woodland or pasture. The less sloping areas are suited to pasture, hayland, and, where stone content is low, to homesites. The ponds or lakes are a possible source of water for irrigation. Erosion and sedimentation, stoniness, and steepness of slopes are the main concerns of management.

Soil Maps for Detailed Planning

The kinds of soil (mapping units) shown on the detailed soil maps at the back of this publication are described in this section. The descriptions together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each soil is given in the section "Use and Management of the Soils."

Preceding the name of each mapping unit is the symbol that identifies the unit on the detailed soil map. Each mapping unit description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated and the management concerns and practices needed are discussed.

A soil mapping unit represents an area on the landscape and consists mostly of the soil or soils for which the unit is named. Most of the delineations shown on the detailed soil map at the back of this publication are phases of soil series.

Most mapping units include small, scattered areas of soils other than those that appear in the name of the mapping unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the mapping unit. The soils that are included in mapping are recognized in the description of each mapping unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places are called *miscellaneous areas*; they are delineated on the soil map and given descriptive names. Mine Dump is an example. Some of these areas are too small to be delineated and are identified by a special symbol on the soil map.

The acreage and proportionate extent of each mapping unit are given in table 4, and additional information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of Tables.") Many of the terms used in describing soils are defined in the Glossary.

Soil Descriptions

3A—Hoyleton silt loam, 0 to 3 percent slopes. This nearly level to very gently sloping, somewhat poorly drained soil is on broad, slightly undulating ridgetops. Individual areas of this soil are rounded or irregular in shape and range from about 5 to 200 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsurface layer is about 10 inches thick. It is pale brown and light yellowish brown silt loam with yellowish red mottles. The subsoil is about 41 inches thick. In the upper 4 inches it is mixed red and brown light silty clay with thick grayish brown films on faces of peds. Below that, it is about 11 inches of mottled grayish brown heavy silty clay loam. Next, it is 12 inches of mottled grayish brown silty clay loam. The lower part of the subsoil, which extends to a depth of 60 inches, is yellowish brown silt loam mottled with light brownish gray. In some areas the surface layer is dark grayish brown.

Included with this soil in mapping are small mine-sink areas and small areas of the poorly drained Wynoose soils. Also included are areas that are mildly alkaline in the lower part of the subsoil. Inclusions make up about 10 percent of this mapping unit.

Water and air move slowly through this soil, and surface runoff in cultivated areas is slow. Reaction ranges from extremely acid in the upper part of the subsoil to neutral in the lower part, and it varies in the surface layer because of local liming practices. The surface layer is friable and easily tilled. Seasonal wetness restricts growth in some years. Organic-matter content is medium, and the available water capacity is high.

Most areas of this soil are farmed. This soil has good potential for cultivated crops, hay, pasture, and trees; fair potential for recreational use; fair to good potential for wildlife habitat and for vegetables and some small fruits; and poor potential for most engineering uses.

This soil is well suited to corn, soybeans, small grain, and grasses and legumes for hay and pasture. Seasonal wetness is the main concern of management, and surface drainage is needed to improve productivity. Shallow ditches are used to provide drainage. The choice of plants and the time for tillage are affected by wetness in areas not adequately drained.

This soil is suited to pasture and hay, but the choice of plants is limited by wetness and potential frost heave. Shallow ditching can drain excess surface water to reduce the hazards. Restricted use during wet periods helps keep the pasture and soil in good condition.

Many vegetables and small fruits grow well on this soil if drainage is provided and fertilizers are added as needed.

Returning crop residue to the soil or regularly adding other organic material helps improve fertility and increase water intake.

This soil is not well suited to building site development because of the wetness hazard, shrink-swell potential, and frost action. Sewage lagoons will function properly for onsite waste disposal. Excess water can be removed by shallow ditching and proper grading. Footings and footing drain tile should be installed at the proper depth to overcome frost action and wetness problems. Capability subclass IIw; woodland suitability subclass 3o.

3B2—Hoyleton silt loam, 3 to 6 percent slopes, eroded. This gently sloping, somewhat poorly drained soil is on knolls and on side slopes along drainageways. Individual areas of this soil are rounded or elongated and range from about 5 to 150 acres in size.

Typically, the surface layer is 6 inches of very dark grayish brown silt loam with some yellowish brown and yellowish red silty clay loam subsoil intermixed. It ranges from 4 to 8 inches thick. The subsoil is about 40 inches thick. The upper part is mixed yellowish red and grayish brown light silty clay; the middle part is about 20 inches of mixed yellowish brown and gray silty clay loam; and the lower part is mottled, yellowish brown silt loam. The substratum to a depth of about 60 inches is mottled brown silt loam. In some places the surface layer is not mixed with subsoil material and is underlain by a thin layer of pale brown silt loam. In other places the subsoil is thicker and contains more clay in the upper part.

Included with this soil in mapping are small mine sinks and areas that are severely eroded. Some areas are mildly to moderately alkaline in the middle and lower parts of the subsoil. Also included are areas of this Hoyleton soil along drainageways with slopes that range to about 10 percent and a few small areas of alluvial soils along the bottom of the drainageways. Inclusions make up about 10 percent of this unit.

Water and air move through this soil at a slow rate, and surface runoff is medium. Reaction ranges from extremely acid in the upper part of the subsoil to neutral in the lower part, and it varies in the surface layer because of local liming practices. The surface layer is friable to firm and slightly difficult to plow. It has a tendency to crust or puddle after hard rains because of the increase in clay content. Organic-matter content is medium, and available water capacity is high. The higher subsoil reaction is caused by an increase of sodium, which reduces rooting depth and limits water uptake.

Most areas of this soil are farmed. This soil has fair potential for cultivated crops and good potential for hay, pasture, and trees. It has fair potential for recreational uses, fair to good potential for wildlife, and poor to fair potential for most engineering uses.

This soil is suited to corn, soybeans, small grain, and grasses and legumes for hay and pasture. There is a hazard of erosion if this soil is cultivated. Minimum tillage, winter cover crops, and grassed waterways help prevent excessive soil loss. Surface crusting can be reduced by returning crop residue to the soil or by adding organic material. The effective rooting depth is limited because of increased sodium content in the subsoil, and yields are likely to be reduced because of a lack of water.

Grasses and legumes grow well on this soil and are effective in controlling erosion. Wetness limits the choice of plants, and winter damage by frost heave is likely. Ditches should be used to remove excess water, and plants tolerant to seasonal wetness should be selected to reduce winter damage.

This soil is not well suited to building site development or onsite waste disposal. Seasonal wetness, permeability, and potential frost action limit use. Proper installation of footings and installing footing drain tile reduce wetness and frost heave. Sewage lagoons function satisfactorily in the less sloping areas if properly installed. Capability subclass IIIe; woodland suitability subclass 3o.

8E—Hickory silt loam, 18 to 30 percent slopes. This moderately steep and steep, moderately well drained or well drained soil is on side slopes just above bottom lands or along drainageways near bottom lands. Individual areas vary from irregular to long and narrow in shape, and they range in size from 2 to about 100 acres.

Typically, the surface layer is dark grayish brown silt loam about 2 inches thick, and the subsurface layer is brown silt loam 3 inches thick. The subsoil is about 51 inches thick. It is yellowish brown, strong brown, and pale brown, firm clay loam with mottles in the lower part. The substratum to a depth of about 62 inches is pale brown loam. In some places the subsoil is thicker.

Included with this soil in mapping are small severely eroded areas. At the base of some slopes or at the heads of drainageways, some areas of the more stony Wellston soils are included and in a few areas there are rock outcrops. Many areas on the upper parts of slopes include the associated Hosmer, Ava, or Alford soils. Inclusions occupy 5 to 15 percent of the unit.

Water and air move through this soil at a moderate rate, and surface runoff is very rapid. Reaction changes, with depth, from extremely acid to neutral in the subsoil. Organic-matter content is low. The surface layer is friable. Available water capacity is high.

Most areas of this soil are in pasture or woodland. This soil has good potential for these uses. It has good to poor potential for wildlife and recreational uses and fair to poor potential for most engineering uses.

This soil is suited to pasture, but establishing a pasture on these steep slopes is difficult. Seeding should be on the contour where practical, and fertilizers should be added according to soil tests. Proper stocking rates, pasture rotation, and timely deferment of grazing during rainy periods help to keep the pasture and the soil in good condition.

This soil is well suited to trees, and many areas remain in woodland. Management problems are plant competition, erosion, and equipment limitations. Proper site preparation controls initial plant competition, and spraying controls subsequent growth. Mechanical planting should be

on the contour. Steeper areas need to be hand planted because of limitations to use of equipment.

This soil is generally unsuitable for building site development or for onsite waste disposal systems because of the steep slopes. Erosion is a severe hazard if the soil is left exposed and bare during site development. Establishing and maintaining vegetative cover are difficult but can be achieved through proper fertilizing, seeding, mulching, and shaping of the slopes. Capability subclass VIe; woodland suitability subclass 1r.

8E3—Hickory soils, 15 to 30 percent slopes, severely eroded. These moderately steep and steep, moderately well drained or well drained soils are on side slopes just above bottom lands or along sides of drainageways. Individual areas are irregular in shape and range from 5 to 50 acres in size.

The surface layer is yellowish brown loam, heavy silt loam, or clay loam about 5 inches thick and consists primarily of subsoil material mixed in by plowing. The subsoil is about 45 inches thick. It is yellowish brown and strong brown, firm clay loam with mottles in the lower part. The substratum to a depth of about 60 inches is pale brown loam. In some places that have not been plowed or that have remained wooded, the surface layer is dark grayish brown or brown silt loam.

Included with these soils in mapping are small areas where slopes are less than 15 percent and some areas that have not been eroded so severely. Hosmer, Ava, and Alford soils are commonly included on the upper parts of slopes and where they are in similar positions on the landscape as Hickory soils. At the base of some slopes or at the head of some drainageways, small areas of the more stony Wellston soils are included. In areas where glacial deposits are thin, mixing with local bedrock has resulted in textures ranging from sandy loam to silty clay. A few gullied areas are also included.

Water and air move through these soils at a moderate rate, and surface runoff is very rapid. Reaction in the subsoil changes with depth from extremely acid to neutral. Organic-matter content is very low. The surface layer is firm and difficult to till when wet. Available water capacity is high.

Most areas of these soils are pastured or are brushy, idle land. A few of the less sloping areas are planted to small grains and hay. The soils have fair potential for pasture, good potential for woodland, and poor potential for most engineering uses.

These soils are not suited to crops, but small grains and hay can be grown occasionally in the moderately steep areas. Controlling erosion, improving tilth, and improving fertility are management problems. Minimum tillage and contour farming limit erosion. Returning crop residue to the soil or adding organic matter improves fertility, reduces crusting, and promotes soil structure.

This soil is suited to pasture, but establishing a pasture on these severely eroded slopes is difficult. Preparation for seeding is not easy because of poor tilth and workability of the soil. Seeding should be on the contour, and fertilizer should be added according to tests. The pasture should be allowed sufficient time to establish, and it should not be overgrazed or grazed when the soil is too wet.

These soils are well suited to trees. Plant competition, erosion, and equipment limitations are management problems in the steeper areas. Proper site preparation will control initial plant competition, and spraying will control subsequent growth. Mechanical planting should be on the contour to help limit erosion. The steeper slopes need to be hand planted.

These soils are generally unsuitable for building site development or for onsite waste disposal systems because of the steep slopes and erosion potential. Capability subclass VIe; woodland suitability subclass 1r.

8G—Hickory silt loam, 30 to 50 percent slopes. This very steep, moderately well drained or well drained soil is on side slopes along drainageways or just above bottom lands. Individual areas are mostly long and narrow, but some are irregular in shape. They range in size from 4 to about 40 acres.

Typically, the surface layer is dark grayish brown silt loam about 2 inches thick, and the subsurface layer is brown silt loam about 3 inches thick. The subsoil is about 50 inches thick. It is yellowish brown or strong brown, firm clay loam with mottles in the lower part. The substratum to a depth of about 60 inches is pale brown loam. In some places, the subsurface layer ranges to about 10 inches thick.

Included with this soil in mapping are small severely eroded areas. A few areas have rock outcrops at the head of drainageways or at the base of slopes. In areas of thin glacial deposits, local bedrock content is high and subsoil textures range from sandy loam to silty clay. A few areas of the more stony Wellston soils are included at the base of some slopes or at the head of drainageways. Many areas include silty Hosmer or Alford soils that are associated on the landscape. They are on the upper parts of slopes and occupy about 10 percent of this mapping unit.

Water and air move through this soil at a moderate rate, and surface runoff is very rapid. Reaction in the subsoil grades with depth from extremely acid to neutral. Organic-matter content is low. The surface layer is friable. Available water capacity is high.

Most areas of this soil are wooded, and a few are pastured. The soil has fair to good potential for woodland, poor to good potential for recreation and wildlife, and poor potential for most other uses.

This soil is best suited to trees because of very steep slopes. Management problems include a severe erosion hazard and equipment limitation. Erosion can be controlled if maximum cover is maintained by selective cutting and careful equipment use.

This soil provides excellent sites for ponds and lakes. It is generally fair for embankment use. Areas shallow to bedrock or containing large amounts of local sandstone or shale need to be carefully investigated. Cuts or borrow areas erode rapidly but can be stabilized by proper fer-

tilization, seeding, mulching, and shaping. Capability subclass VIIe; woodland suitability subclass 1r.

12—Wynoose silt loam. This nearly level, poorly drained soil is on broad drainage divides in the upland till plain area of the county. Individual areas of these "claypan" soils are irregular in shape and range from 2 to several hundred acres in size.

Typically, the surface layer is grayish brown silt loam about 5 inches thick. It has many fine iron-manganese concretions (buckshot). The subsurface layer, 9 inches thick, is light gray and light grayish brown silt loam with yellowish brown mottles. The subsoil is about 44 inches thick. The upper 18 inches of the subsoil is grayish brown silty clay with yellowish brown mottles. The next 26 inches is grayish brown silty clay loam with yellowish brown mottles. In some places the surface layer is very dark grayish brown or dark grayish brown and the upper part of the subsoil has red mottles. The lower part of the subsoil in places has a reaction of neutral or mildly alkaline.

Included with this soil in mapping are small areas of the somewhat poorly drained Bluford and Hoyleton soils. They occupy slightly higher positions on the landscape near slope breaks or narrow finger ridges between lateral drainageways. They make up about 5 percent of the unit. Also included are small depressions or mine sinks, some of which are ponded or remain wetter than the surrounding area.

Water and air move through this soil very slowly, and surface runoff is slow to ponded. Reaction ranges from extremely acid to medium acid in the subsoil and varies widely in the surface layer as a result of local liming practices. The surface layer is friable and easily tilled. Organic-matter content is low, and the surface layer crusts over or puddles after hard rains. Available water capacity is moderate and not sufficient for optimum growth during some growing seasons.

Most areas of this soil are farmed. This soil has fair to good potential for cultivated crops, hay, pasture, and trees; poor potential for recreation uses because of wetness; fair to good potential for wildlife use; and poor potential for most engineering uses.

This soil is suited to corn, soybeans, milo, and small grains. Soil wetness is the main problem to overcome to improve this poorly drained soil. It limits plant suitability and affects the time of tilling and harvesting. It can be reduced by shallow ditching and land leveling. Surface crusting and compaction is a secondary problem that can be reduced by minimum tillage, crop rotation, and incorporating organic matter into the surface layer. Low fertility is also a problem. It can be overcome by crop rotation and fertilizing.

This soil is suited to pasture or hay if there is adequate surface drainage. Wetness limits the choice of plants and the period of grazing or cutting, and it increases winterkill damage. Ditching and land leveling to remove excess water are helpful in reducing the problem.

This soil is suited to trees that can tolerate wetness. The main management problem is controlling competing vegetation. This can be done by site preparation, spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees.

This soil is well suited to wetland wildlife. Wildlife areas could center around mine-sink areas, some of which pond water for extended periods. Wetland wildlife and wetland plants do well around these and other areas of this soil.

Most engineering uses of this soil are hampered by seasonal wetness, high clay content, high volume change on wetting or drying of upper subsoil material, and very slow permeability. These problems are not easy to overcome, and the soil remains difficult to work. Sewage lagoons and excavated ponds are uses that are well suited to this soil. Capability subclass IIIw; woodland suitability subclass 4w.

13A—Bluford silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on broad, undulating ridgetops or just above the head of drainageways. Individual areas are irregular in shape and range from 2 to about 100 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer, about 10 inches thick, is brown and pale brown silt loam with yellowish brown mottles. The subsoil is about 54 inches thick. The upper 11 inches of the subsoil is dark yellowish brown and yellowish brown silty clay loam and silty clay; the next 17 inches is brown and grayish brown silty clay loam with yellowish brown mottles; and the lower 26 inches is brown, firm and slightly brittle silt loam with light brownish gray mottles. In some places the surface layer has not been mixed by plowing and is thinner. Some areas have a neutral reaction in the lower part of the subsoil.

Included with this soil in mapping are small areas of the poorly drained Wynoose soils. They occupy slight depressions on the landscape. Mine sinks are also included and some are ponded for extended periods and cause the surrounding area to remain wet.

Water and air move through this soil at a moderate to slow rate, and surface runoff is slow. Reaction ranges from extremely acid to medium acid in the subsoil and varies widely in the surface layer as a result of local liming practices. The surface layer is friable and easily tilled. Organic-matter content is low, and the surface layer crusts over or puddles after hard rains. The subsurface layer restricts root growth and water movement because of its platy structure, which results in droughtiness. Available water capacity is moderate to high.

Most areas of this soil are farmed. This soil has fair to good potential for cultivated crops, hay, pasture, and trees; fair potential for recreational uses; fair to good potential for wildlife; and fair to poor potential for most engineering uses.

This soil is suited to corn, soybeans, grain sorghum, and wheat. Soil wetness is the main problem to overcome to

improve this soil. It can be reduced by shallow surface ditching and land leveling. Crusting and compaction of the surface layer and poor penetration of the subsurface layer by both roots and water are additional management problems. These problems can be reduced by minimum tillage, crop rotation, and incorporating organic matter into the surface layer. Chisel plowing and deep plowing to mix the surface and subsurface layers help disrupt the platiness of the subsurface layer.

This soil is suited to hay or pasture if there is adequate surface drainage. Wetness limits the choice of plants and the period of cutting or grazing, and it increases winter-kill damage. Overgrazing or cutting when the soil is too wet causes surface compaction. Proper stocking rates, pasture rotation, and timely deferment of grazing or cutting during wet periods help to keep the pasture or hay and soil in good condition.

This soil is well suited to trees, and some areas remain in timber. There are no major limitations to this use, except that during wet periods some equipment cannot be adequately used. Competing vegetation should be controlled by site preparation, spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees.

This soil is suited to wildlife use, especially around mine-sink areas, some of which pond water for extended periods. These areas are best developed for wetland plants and wildlife.

This soil is not well suited to building site development or to waste disposal systems in absorption fields because of shrink-swell, slow permeability, and wetness. Sewage lagoons function properly and are a good alternative to septic tank absorption fields. Installing footing tile and placing footings at a proper depth reduce wetness and shrink-swell. Unless properly banked and ditched, local streets and roads will be damaged by frost action and shrink-swell. Capability subclass IIw; woodland suitability subclass 3o.

13B—Bluford silt loam, 2 to 4 percent slopes. This gently sloping, somewhat poorly drained soil is on narrow to broad ridgetops, side slopes, and foot slopes and at the head of drainageways. Individual areas of this unit are irregular in shape and range from 2 to about 150 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer, about 5 inches thick, is pale brown silt loam with yellowish brown mottles. The subsoil is about 54 inches thick. The upper 11 inches of the subsoil is dark yellowish brown and yellowish brown silty clay loam and silty clay; the next 17 inches is brown and grayish brown silty clay loam with yellowish brown mottles; and the lower 26 inches is brown, firm and slightly brittle silt loam with light brownish gray mottles. In some places the surface layer has not been mixed by plowing and is thinner. In some places the upper part of the subsoil contains less clay and lacks silty clay or heavy silty clay loam.

Included with this soil in mapping are small areas of a soil that is severely eroded. The soil has a silty clay loam surface layer that is difficult to work. Also included are areas of a soil, at the head of drainageways or on side slopes, that has a surface layer, 4 to 8 inches thick, that contains some subsoil material. This soil makes up 2 to 5 percent of this mapping unit. Mine sinks are also included and some are ponded for extended periods, causing the surrounding area to remain wet.

Water and air move through this soil slowly, and surface runoff is medium. Reaction ranges from extremely acid to medium acid in the subsoil and varies widely in the surface layer as a result of local liming practices. The surface layer is friable and easily tilled where not eroded. Organic-matter content is low, and the surface layer crusts over or puddles after hard rains. The platiness of the subsurface layer restricts root growth and downward water movement and results in droughtiness. Available water capacity is moderate to high.

Most areas of this soil are farmed. This soil has fair to good potential for cultivated crops, hay, pasture and trees; fair potential for recreational use; fair to good potential for most wildlife; and fair to poor potential for most engineering uses.

This soil is suited to corn, soybeans, grain sorghum, and wheat. If this soil is used for cultivated crops, there is a hazard of erosion. Minimum tillage, winter cover crops, and grassed waterways help prevent excessive soil loss. Crusting and compaction of the surface layer and poor penetration of the subsurface layer by both roots and water are additional management problems that can be reduced by crop rotation and incorporating organic matter into the surface layer. Disrupting the platiness of the subsurface layer by deep tillage or chisel plowing increases the downward movement of water and root growth.

The use of this soil for hay or pasture is also effective in controlling erosion. Overgrazing or cutting when the soil is wet causes surface compaction and increases runoff. Timely deferment of grazing or cutting during wet periods helps keep the pasture or hay and soil in good condition.

This soil is well suited to trees, and a few areas remain in native hardwoods. There are no serious hazards after an adequate stand of trees is established to limit erosion.

This soil is suited to wildlife, especially around mine-sink areas, some of which are ponded for extended periods. These areas, although small, can best be developed for wetland plants and wildlife.

This soil is not well suited to building site development or to waste disposal in absorption fields because of shrink-swell, slow permeability, and wetness. Sewage lagoons installed in the less sloping areas of this soil are a good alternative to septic-tank filter fields. Installing footing tile and placing footings at a proper depth reduce wetness and shrink-swell. Local streets and roads should be banked and properly ditched to remove excess water and to reduce damage from shrink-swell and frost action. Capability subclass IIe; woodland suitability subclass 3o.

14B—Ava silt loam, 2 to 6 percent slopes. This gently sloping, moderately well drained soil is on ridgetops, knolls, and short, uneven side slopes along drainageways. Individual areas of this unit are irregular in shape and range from 2 to about 30 acres in size.

Typically, the surface layer is dark brown silt loam about 7 inches thick. It ranges from 5 to 9 inches in thickness over most of the area. The subsoil is about 50 inches thick. The upper part is brownish yellow heavy silt loam about 13 inches thick. The lower part is 3 inches of strong brown light silty clay loam with thick coatings of light gray, 16 inches of mottled yellowish brown silty clay loam grading to mottled strong brown heavy silt loam, 9 inches of firm and dense, mottled strong brown heavy silt loam, and 9 inches of firm and dense, mottled strong brown silt loam. The substratum to a depth of about 68 inches is mottled dark brown silt loam.

Included with this soil in mapping are small areas of somewhat poorly drained Bluford soils at the head of drainageways and on the ridgetops just above drainageways. They make up 5 to 10 percent of this mapping unit. Also included are a few severely eroded areas, a few small areas of poorly drained Wynoose soils, and a few mine sinks.

Water and air move through this soil at a moderately slow rate in the upper part of the subsoil and at a very slow rate in the lower part. Surface runoff is medium. Reaction ranges from strongly acid to extremely acid in the subsoil and varies widely in the surface layer as a result of local liming practices. The surface layer is friable and easily tilled but tends to crust or puddle after hard rains, especially in areas where the plow layer contains subsoil material. Organic-matter content is low. Available water capacity is moderate. Root development is restricted below a depth of about 39 inches by the dense, compact silty material.

Most areas of this soil are farmed. This soil has fair to good potential for cultivated crops, hay, pasture and trees; fair to good potential for most recreation and wildlife uses; and fair to poor potential for most engineering uses.

This soil is suited to corn, soybeans, grain sorghum, small grain, and grass and legumes grown for hay and pasture. If the soil is used for crops, there is a hazard of erosion. Minimum tillage, winter cover crops, crop rotation, and grassed waterways help prevent excessive soil loss. In a few areas slopes are long enough and smooth enough to be terraced or farmed on the contour. Returning crop residue to the surface or regularly adding other organic material helps to improve fertility, reduce crusting, and increase water intake.

The use of the soil for pasture or hay helps in controlling erosion. Proper stocking rates, crop rotation, restricted use during wet periods, and clipping help maintain the pasture and keep the soil in good condition.

This soil is suited to trees, and a few areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed through proper site preparation, spraying, cutting, or girdling.

This soil is suitable for building site development if proper design and installation procedures are used. These include installing footing drains and placing the footings below the depth of frost action. Very slow permeability in the lower part of the subsoil is a problem for septic-tank absorption fields. The soil is suitable for sewage lagoons if slope is considered in the design. Proper grading and banking of streets and roads help increase stability of slopes and reduce the effects of frost action. The more sloping areas along drainageways provide good water storage sites, but dams must be constructed carefully to increase soil strength. Capability subclass IIe; woodland suitability subclass 2o.

14C3—Ava silty clay loam, 6 to 12 percent slopes, severely eroded. This sloping, moderately well drained soil is on short, uneven side slopes along drainageways. Individual areas of this soil are irregular in shape and range from 2 to about 25 acres in size.

Typically, the surface layer is yellowish brown light silty clay loam about 4 inches thick. It ranges from 2 to about 5 inches thick over most of the area. The subsoil is about 40 inches thick. In the upper 4 inches it is yellowish brown silty clay loam; the next 15 inches is dark brown silty clay loam with grayish brown mottles; and the lower 21 inches is mixed brown and grayish brown silt loam that is firm and brittle. The substratum to a depth of about 60 inches is dark brown and pinkish gray silt loam. In some places that are not severely eroded, the surface layer is dark brown silt loam about 7 inches thick and is mixed with some of the yellowish brown subsoil. In timbered areas, the surface layer is not mixed with the subsoil and is underlain by a subsurface layer about 3 inches thick.

Included with this soil in mapping are small areas, at the head of drainageways, of the somewhat poorly drained Bluford soils and, at the base of some slopes, areas of the moderately well drained Hickory soils. Also included is recent silty colluvial material that washed from the surrounding slopes. Inclusions make up 10 to 15 percent of the acreage.

Water and air move through this soil at a moderately slow rate in the upper part of the subsoil and at a very slow rate in the lower part. Surface runoff is rapid. Reaction ranges from strongly acid to extremely acid and varies widely in the surface layer as a result of local liming practices. The surface layer is firm and difficult to work into an adequate seedbed because it mostly consists of the more clayey subsoil. Clods form if the soil is worked when wet, and the soil crusts or puddles after hard rains. Organic-matter content is very low, and available water capacity is moderate. Root development is restricted below a depth of about 2 feet by dense, compact silty material.

Most areas are farmed. This soil has poor to fair potential for cultivated crops and fair to good potential for hay, pasture, and trees. It has poor to good potential for

recreation uses, fair to good potential for most wildlife uses, and poor to fair potential for most engineering uses.

This soil is suited to cultivated crops and small grain only in rotation with grass and legumes. If this soil is used for crops, there is a hazard of further erosion. Returning crop residue to the surface or regularly adding organic material helps to improve fertility, reduce crusting, and increase water intake. In a few areas slopes are smooth enough to farm on the contour or be stripcropped.

This soil is best suited to grasses and legumes grown for hay or pasture. Grass and legume seeds can be sown in a nurse crop of small grain to help establish stands. Vegetative cover should be kept in good condition by using proper stocking rates, timely cutting and grazing, and restricting use during wet periods.

This eroded unit can also be well protected from erosion by trees. Some small, less eroded areas remain in native hardwoods that have a fair growth rate. There is some erosion hazard when crops are established, but this can be controlled by planting on the contour and by keeping crop residue on the surface. Competing vegetation can be controlled by mowing, spraying, or proper site preparation.

This soil is not well suited to building site development or onsite waste disposal because it has strong slopes and slow permeability in the lower part of the subsoil. Most building sites require cutting and filling; differential settlement is a problem on such sites. This unit provides good sites for water storage, but careful construction of the dam is necessary to increase soil strength and stability. Capability subclass IVe; woodland suitability subclass 2o.

71—Darwin silty clay. This nearly level, poorly drained or very poorly drained soil is on broad flats and in narrow depressions and sloughs on bottom lands. Individual areas of this soil are elongated or irregular in shape and range from 20 to more than 1,000 acres in size.

Typically, the surface layer is very dark gray silty clay about 11 inches thick. The subsoil is about 37 inches thick. It is dark gray silty clay and clay with prominent, dark brown mottles. The substratum to a depth of about 60 inches is dark gray silty clay and clay. In some places the dark surface layer is only about 7 inches thick, the substratum is clay loam, loam, or sandy loam, or the subsoil is strongly acid.

Included in mapping are small areas of sandy overwash and small wet areas of this Darwin soil that are ponded for extended periods in cutoffs, sloughs, and channels. Inclusions make up 2 to 5 percent of this unit.

Water and air move through this soil at a very slow rate, and surface runoff is slow to ponded. Reaction ranges from slightly acid to mildly alkaline in the surface layer and subsoil. The surface layer is very hard when dry and very sticky when wet. Clods form if this soil is worked when wet. Organic-matter content is medium, and available water capacity is moderate. Root development is restricted in most years by a fluctuating water level. Shrink-swell potential is very high, and wide cracks develop during dry periods. In some years, the choice of plants is restricted by overflow.

Most areas of this soil are farmed. This soil has fair potential for cultivated crops and poor to fair potential for hay, pasture, and trees. It has good potential for wetland wildlife and poor potential for most engineering uses.

This soil is suited to corn, soybeans, grain sorghum, small grain, and some specialty crops, such as sunflowers and pumpkins, if the wetness hazard is controlled. Shallow ditches at frequent intervals and land leveling are commonly used to reduce wetness in the surface layer. Because of very slow permeability, subsurface tile do not function satisfactorily unless very closely spaced. Surface tilth is poor but can be improved by fall plowing, by providing drainage, by incorporating crop residues into the surface layer, and by practicing minimum tillage to reduce compaction.

Hay and pasture can be grown on this soil if adequate drainage is provided. Wetness-tolerant grasses and legumes should be favored. Proper stocking rates, pasture rotation, and restricted use during wet periods help to keep pasture and soil in good condition.

This soil has serious limitations for building site development and for onsite waste disposal. It has a water level that is at or within 2 feet of the surface during wet periods. Because of the very slow movement of water through this soil, it is difficult to drain adequately. Shrink-swell potential is very high. Flooding or ponding for extended periods also restricts use. Most areas can be protected from flooding by levees and dikes. One favorable use of this soil is for water reservoirs, and some catfish ponds have been developed on this soil. Capability subclass IIIw; woodland suitability subclass 3w.

71+—Darwin silt loam. This nearly level, poorly drained or very poorly drained soil is on flats and in depressions and narrow drainageways on bottom lands. Individual areas of this soil are irregular in shape and range from 5 to about 300 acres in size.

Typically, the upper part of the surface layer is very dark grayish brown silt loam about 14 inches thick. It ranges from 8 to 20 inches over most of the area. The lower part of the surface layer is very dark gray silty clay about 11 inches thick. The subsoil is about 37 inches thick. It is dark gray clay with prominent, dark brown mottles. The substratum to a depth of about 74 inches is dark gray silty clay. In some places the surface layer is silty clay loam, loam, or clay loam and the surface color is dark grayish brown or brown.

Included in mapping near the levee are areas of sandy overwash. They make up about 15 percent of this unit.

Water and air move through this soil at a very slow rate, and surface runoff is slow. Reaction ranges from slightly acid to mildly alkaline. The surface layer is friable and easy to till. The underlying clayey material tends to "perch" water, causing the silty overwash to remain wet for extended periods. Root development is restricted by the fluctuating water level.

Most areas of this soil are farmed. This soil has fair potential for cultivated crops, hay, pasture, and trees. It has poor to fair potential for recreation and wildlife uses and poor potential for most engineering uses.

This soil is suited to corn, soybeans, grain sorghum, small grain, and some specialty crops if wetness is reduced. Shallow ditches at frequent intervals and land leveling are methods commonly used to reduce wetness. Droughtiness caused by deep sandy overwash can be eliminated by land leveling and deep tillage that mixes the sandy and underlying clayey materials. Some of these sandy areas are well suited to melons and early vegetables if they are protected from wind erosion and properly fertilized.

Hay and pasture can be grown on this soil if adequate drainage is provided. Use should be restricted during wet periods to keep pasture and soil in good condition. Wetness-tolerant grasses and legumes should be favored.

This soil has serious limitations for building site development and for onsite waste disposal because of very high shrink-swell potential, very slow permeability, flooding hazard, and the fluctuating water level. Areas with sandy overwash are somewhat better building sites. Footing drain tile should be used to remove "perched" water and reduce the wetness hazard. Capability subclass IIIw; woodland suitability subclass 3w.

F71—Darwin silty clay, frequently flooded. This nearly level, poorly drained or very poorly drained soil is on broad flats and narrow channels primarily on the unprotected side of the levee on the Mississippi River flood plain. A few areas are on the protected side of the levee near old levee breaks. Individual areas of this soil are elongated or irregular in shape and range from 5 to about 500 acres in size.

Typically, the surface layer is very dark gray silty clay about 9 inches thick. The substratum to a depth of about 64 inches is very dark grayish brown silty clay in the upper 9 inches, dark gray light silty clay in the middle 24 inches, and gray and dark grayish brown in layers of very fine sandy loam, loam, and silty clay loam in the lower part. In some places the surface layer is silty clay loam. In other places the substratum is layered, with textures ranging from sand to silty clay.

Included with this soil in mapping are areas of recent sandy overwash and a few areas of soils that have short, steep slopes. Also included are areas of Medway soils, frequently flooded, on low ridges and areas where loamy and sandy sediments make up most of the substratum. Inclusions make up 10 to 15 percent of this unit.

Water and air move through this soil at a slow to very slow rate, and surface runoff is slow to ponded. Reaction ranges from neutral to moderately alkaline, and the substratum is normally calcareous. The surface layer is firm to very firm and difficult to till. It is slow to dry and sticky when wet, and clods form if it is worked when wet. Organic-matter content is medium, and available water capacity is moderate. Root development is restricted by a seasonal high water level. Shrink-swell potential is very high, and the surface cracks during dry periods. This soil is flooded frequently and for long periods.

Most areas of this soil are farmed. This soil has poor to fair potential for cultivated crops, hay, pasture, and trees. It has poor potential for recreation uses, good potential for wetland wildlife, and poor potential for most engineering uses.

This soil is suited to corn, soybeans, and grain sorghum. Frequent flooding of this unprotected soil is the main limitation. Flooding often damages or destroys crops growing on this soil and limits the choice of plants in most years. Poor tilth and wetness are additional limitations. Tilth can be improved by reduced tillage and by returning crop residue to the surface. Fall plowing is not recommended because of the hazard of erosion during flooding. Shallow ditches are effective in removing excess surface water from this soil.

This soil is suited to trees, and some areas remain in native hardwoods. Seedling mortality and equipment limitations are problems. The clayey surface soil is difficult to compact around roots and often requires hand planting for best results. Flooding and deposition are likely to cause damage to seedlings and restrict planting or harvesting operations.

Building sites, roads, and onsite waste disposal systems are generally unsuited on this soil because of frequent flooding. In most areas of this soil, overcoming the flooding hazard is not feasible. Capability subclass IVw; woodland suitability subclass 3w.

W71—Darwin silty clay, wet. This nearly level, poorly drained or very poorly drained soil is in low depressions in old channels, in sloughs, and along drainageways. Individual areas of this soil are mostly narrow and elongated in shape and range from 5 to about 200 acres in size.

Typically, the surface layer is very dark gray silty clay about 11 inches thick. The surface layer is normally saturated or water ponds on the surface for extended periods. The subsoil is about 37 inches thick. It is dark gray clay and silty clay with prominent, dark brown mottles. The substratum to a depth of about 60 inches is dark gray silty clay. In some places the dark surface layer is only about 5 inches thick. In other places some part of the subsoil is strongly acid.

Included in mapping are small areas of this Darwin soil that are not so wet. Also included are areas of silt loam or silty clay loam overwash usually at the outer edges where more silty soils adjoin this mapping unit. Inclusions make up about 5 percent of the unit.

Water and air move through this soil at a very slow rate, and water is at or near the surface during the growing season in most years. Reaction ranges from slightly acid to mildly alkaline. This soil is too wet to till in most years. The surface layer is very hard when dry and very sticky when wet. Clods form if this soil is worked when wet. Shrink-swell potential is very high, and wide cracks develop during dry periods. Organic-matter content is medium, and available water capacity is moderate. Root development is restricted by the fluctuating water level.

Most large areas of this soil are timbered; some are used for pasture. This soil has poor potential for cultivated crops, hay, and pasture and poor to fair potential for trees. It is too wet for recreational use, but has good potential for some wildlife habitat. It has poor potential for engineering uses.

Cultivated crops and hay are not normally suited to this soil because of the extreme wetness hazard (fig. 7). The low position on the landscape and the very slow permeability make this soil difficult to drain. Deep ditches or tile inlets are usually needed.

Some areas are suited to pasture, but the length of their use is limited by wetness. The quality of the pasture is poor because few grass species can tolerate the wetness. Restricted use during wet periods is necessary to keep the pasture and the soil in good condition.

This soil is fairly well suited to trees that tolerate wetness, and most areas remain in native hardwoods. Seedling mortality and equipment limitations are management problems. Hand planting of nursery stock is usually necessary to establish or improve a stand. Machine planting is sometimes possible in dry years.

The best use of this soil is for wetland wildlife habitat. Shallow-water areas are easily established in old sloughs and channels.

This soil has very serious limitations for building site development and for onsite waste disposal because of its shrink-swell potential, very slow permeability, and wetness. Capability subclass Vw; woodland suitability subclass 3w.

84—**Okaw silt loam.** This nearly level, poorly drained or very poorly drained soil is on broad drainage divides on the upper terrace level and in nearly level to gently sloping areas on the lower terrace level. Individual areas are irregular in shape or are rounded and range from about 3 to 500 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsurface layer is light brownish gray silt loam about 8 inches thick. It has yellowish mottles. The subsoil is about 39 inches thick. In the upper 16 inches it is grayish brown silty clay with yellowish brown mottles; the lower 23 inches is olive gray silty clay with yellowish brown mottles. The substratum to a depth of 63 inches is olive gray silty clay. In some places the surface layer is darker colored. Also, some areas have less clay in the lower part of the subsoil, and the substratum is layered with silt loam and silty clay loam.

Included in mapping on the upper terrace level are small areas of somewhat poorly drained Hurst soils that have similar slopes. Also included are small areas of short, steep slope breaks, wet spots of the same soil, and a few mine sinks. The lower terrace level has inclusions of small sandy areas, escarpments, severely eroded spots, areas of short, steep slopes, and areas of better drained soils that have slopes of up to 10 percent. Inclusions make up 2 to 5 percent of this unit.

Water and air move through this soil at a very slow to slow rate, and surface runoff is slow to ponded. Reaction ranges from extremely acid to medium acid in the subsoil and varies widely in the surface layer as a result of local liming practices. The surface layer is friable and easily tilled. It tends to crust or puddle after hard rains. Organic-matter content is low, and available water capacity is moderate. Surface drainage is needed because water "perches" above the clayey subsoil (fig. 8).

Most areas of this soil are farmed. This soil has fair potential for cultivated crops, hay, and pasture. It has poor potential for recreation uses, fair to poor potential for woodland, and poor potential for most engineering uses.

This soil is suited to corn, soybeans, grain sorghum, small grain, and grasses and legumes grown for hay and pasture if adequate surface drainage is provided. Shallow ditching and land leveling will reduce the wetness hazard. Surface crusting and compaction can be reduced by returning crop residue to the soil and by minimum tillage methods. Chisel plowing into the subsurface layer will increase the water intake of this layer. Wetness-tolerant grasses and legumes should be used when planting for hay or pasture. Winter damage of small grain, grass, and legumes is likely in areas that are not adequately drained on the surface. Proper stocking rates, pasture rotation, and restricted use during wet periods help to keep both pasture and soil in good condition.

This soil is suited to trees, and many small areas remain in native hardwoods. Plant competition and equipment limitations are problems for management. Shallow ditches and land leveling help reduce the wetness that limits equipment use. Plant competition can be controlled by site preparation and by spraying, cutting, or girdling unwanted trees, shrubs, and weeds.

Most engineering uses are severely limited because of wetness and very slow to slow permeability. Structures placed on this soil need special design to overcome shrink-swell and wetness hazards. Sewage lagoons function well on this soil. Capability subclass IIIw; woodland suitability subclass 4w.

85—**Jacob clay.** This nearly level, poorly drained or very poorly drained soil is on broad flats and in narrow channels on bottom lands. Individual areas of this soil are irregular or elongated in shape and range from about 20 to more than 1,000 acres in size.

Typically, the surface layer is dark gray clay about 4 inches thick. The subsoil is about 46 inches thick. It is gray clay mottled with olive brown in the upper 30 inches, and the lower 16 inches is olive gray clay. The substratum to a depth of 60 inches is grayish brown clay with light olive brown mottles. In some places the surface layer is thicker and darker colored. In a few places the substratum has more sand and less clay, and the colors are not so gray.

Included in mapping are small areas that are ponded for extended periods, a few areas that are sandy at the surface, and a few areas that have short, steep slopes.

Also included are a few areas that have a silty clay loam surface layer. Inclusions make up about 2 to 5 percent of this unit.

Water and air move through this soil at a very slow rate, and surface runoff is slow to ponded. Reaction ranges from extremely acid to strongly acid. The surface layer is very firm and extremely difficult to till. Clods form if this soil is worked when wet. Organic-matter content is low, and available water capacity is moderate. Root development is restricted in most years by the fluctuating water level. Shrink-swell potential is very high, and wide cracks develop during dry periods. The choice of plants is restricted by flooding in some years.

Most areas of this soil are in woodland; some have been cleared for cultivated crops. This soil has poor to fair potential for cultivated crops and for hay, pasture, and trees. The potential for recreation uses is poor, for wildlife habitat it is fair, and for most engineering uses it is poor.

This soil is suited to grain sorghum, soybeans, and small grain if the wetness hazard and flooding are controlled. Shallow ditches at frequent intervals and land leveling are commonly used to reduce surface wetness (fig. 9). Surface tilth can be improved by fall tillage, by working the soil only when it is dry, by incorporating crop residue into the soil, and by practicing minimum tillage to reduce compaction. Available water capacity is not usually sufficient to grow corn economically.

Hay and pasture can be grown on this soil if adequate drainage and protection from flooding are provided. Wetness-tolerant grasses and legumes should be favored. Restricted use during wet periods helps to keep both pasture and soil in good condition.

This soil is suited to trees, and many large areas remain in native hardwoods. Much of "Oakwood Bottoms," an area between the Big Muddy River and Fountain Bluff set aside for wildlife habitat and hunting, is covered with pin oaks. The clayey surface increases seedling mortality and limits the use of mechanical planters. Plant competition can be controlled by proper site preparation, spraying, cutting, or girdling.

This soil has very serious limitations for building site development and for onsite waste disposal because of flooding, seasonal wetness, very slow permeability, very high shrink-swell potential, and poor workability. Levees and dikes can protect this soil from flooding, and surface leveling removes excess water. Sewage lagoons can be installed where protected from flooding. Capability subclass IVw; woodland suitability subclass 3w.

W85—Jacob clay, wet. This nearly level, poorly drained or very poorly drained soil is on broad flats and in sloughs and narrow depressions along drainageways on bottom lands. Individual areas of this soil are mostly irregular or elongated in shape and range from about 10 to more than 1,000 acres in size.

Typically, the surface layer is dark gray clay about 4 inches thick. The surface layer is normally saturated or is ponded for extended periods. The subsoil is about 46 inches thick. It is gray clay with olive brown mottles in the upper 30 inches. The lower 16 inches of the subsoil is olive gray clay. The substratum to a depth of 60 inches is grayish brown clay with light olive brown mottles. The subsoil, in some places, has greenish gray colors. The surface layer is darker colored in places, and in some depressions it is silt loam or silty clay loam.

Included in mapping are a few areas of this Darwin soil that are not so wet. These areas are most common within Oakwood Bottoms. Inclusions make up about 5 percent of this unit.

Water and air move through this soil at a very slow rate, and water ponds on the surface. Reaction ranges from extremely acid to strongly acid. In cleared areas this soil is too wet to till in most years. Shrink-swell potential is very high, and wide cracks develop during dry periods. Organic-matter content is low, and available water capacity is moderate. Root development is restricted by the wetness.

Most large areas of this soil are timbered. This soil has poor potential for cultivated crops, hay, and pasture and poor to fair potential for trees. It has poor potential for recreation uses, fair potential for wildlife, and poor potential for engineering uses.

This soil is not suited to cultivated crops, hay, and pasture because of the extreme hazard of wetness. Its low position on the landscape and very slow permeability make drainage of most areas difficult. Deep ditches with good outlets are needed to drain this soil.

This soil is sparsely timbered because of wetness. Seedling mortality and equipment limitations are management problems. Hand planting of wetness-tolerant trees is necessary to establish or improve a stand. It is difficult for seedlings to become established in the clay surface soil.

This soil is best suited to wetland wildlife habitat and special recreational developments. Oakwood Bottoms is the largest of several areas that have been developed to attract wetland wildlife. These uses have turned this soil's limitations of extreme wetness and very slow permeability into assets.

This soil is generally unsuited to engineering uses in its natural condition. Drainage is difficult, and the clay material is very sticky and difficult to work. Capability subclass Vw; woodland suitability subclass 3w.

108—Bonnie silt loam. This nearly level, poorly drained soil is in low areas on flood plains. Individual areas of this soil are elongated or irregular in shape and range from 5 to about 600 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The substratum, to a depth of about 45 inches, is very strongly acid. It is mottled gray silt loam in the upper 24 inches and mottled light brownish gray silt loam in the next 14 inches. Below this is a firm and slightly brittle layer that extends to a depth of about 60 inches. It is mottled brown silt loam. In some places the firm, slightly brittle layer is not so acid. A few areas have a silty clay loam surface layer.

Included with this soil in mapping are small areas of soils that are sandy, a few mine sinks, areas of bedrock outcrops along streams, and small areas of the same soil that are ponded for extended periods. Also included are areas of Racoon, Belknap, and Wakeland soils. Racoon soils are usually near the edge of the flood plain or on slight rises within the flood plain. Belknap and Wakeland soils are on natural levees near the streams. Inclusions make up 15 percent of this unit.

Water and air move through this soil at a slow to moderate rate, and surface runoff is slow to ponded. Reaction ranges from extremely acid to medium acid in the subsoil and varies in the surface layer because of liming. The surface layer is friable and easy to till but dries slowly in spring. Surface crusts form because of weak structure and low organic-matter content. Available water capacity is high. This soil has a seasonal high water level at or near the surface and is flooded frequently.

Most areas of this soil are in pasture or in native hardwoods. This soil has fair potential for cultivated crops, hay, pasture, and trees. The potential for recreational uses is poor, the potential for wildlife uses is mostly fair to good, and the potential for most engineering uses is poor.

This soil is suited to corn, soybeans, grain sorghum, and grasses and legumes. The main management concerns are flooding and the seasonal high water level. Flooding is impractical to control in most places, but the hazard can be reduced by planting crops less likely to be damaged by spring floods. Excess water can be removed by shallow ditches, and surface crusting can be reduced by practicing minimum tillage and by returning crop residue to the soil.

Wetness-tolerant grasses and legumes should be planted to maintain good stands on this soil. Fertilizers, especially lime and nitrogen, should be added to improve the soil and promote good growth. Deferred grazing or cutting during wet periods keeps the crop and the soil in good condition.

Trees adapted to this soil grow well if plant competition is controlled or removed by proper site preparation or by spraying, cutting, and girdling. Other management problems, for example, equipment limitations and seedling mortality, are not so easy to overcome. Trees should be planted or harvested during the fall when this soil is usually dry, and wetness-tolerant trees should be planted.

Flooding and wetness limit the suitability of this soil for building sites and waste disposal systems. Flooding can be prevented by levees, but they are impractical in most areas of this soil. Capability subclass IIIw; woodland suitability subclass 2w.

109—Racoon silt loam. This nearly level, poorly drained soil is on stream terraces and upland breaks that grade to alluvial soils. Individual areas of this soil are irregular in shape and range from about 5 to 50 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsurface layer is silt loam that is grayish brown in the upper 7 inches and light brownish gray in the lower 11 inches. The subsoil is about 41 inches thick. It is light brownish gray silty clay loam mottled with strong brown and grades to silt loam in the lower 5 inches. In some places the lower part of the subsoil is silty clay.

Included with this soil in mapping are small areas that remain wet for extended periods and a few small mine-sink areas. Also included are small areas of Wynoose silt loam and Okaw silt loam, which have a thinner subsurface layer and more clay in the surface layer than the Racoon soil. Inclusions make up about 2 to 5 percent of this unit.

Water and air move through this soil at a slow rate, and surface runoff is slow. Reaction ranges from extremely acid to strongly acid in the subsurface layer and subsoil and varies in the surface layer because of local liming practices. The surface layer is friable and easily tilled but remains wet late in spring because of the high water level. The surface tends to crust or puddle after hard rains because of poor structure and low organic-matter content. Available water capacity is high.

Most areas of this soil are farmed. This soil has fair to good potential for cultivated crops, hay, pasture, and trees. It has poor potential for most recreational uses because of wetness, fair to good potential for wildlife, and poor potential for most engineering uses.

This soil is suited to corn, soybeans, grain sorghum, small grain, and grasses and legumes grown for hay and pasture. Ditches and diversions are needed to remove excess water and protect this soil from runoff from adjoining slopes. Adding fertilizers and returning crop residue to the soil reduce crusting and improve crop growth. In some years the choice of plants is limited by wetness. Restricted use of pasture during wet periods helps to keep the pasture and soil in good condition.

This soil is suited to trees, and a few areas remain in native hardwoods. Only species that can tolerate seasonal wetness should be planted. Plant competition should be controlled by site preparation, cutting, or spraying.

This soil is not well suited to building site development or onsite filter-field waste disposal because of wetness. It is suited to sewage lagoons, which will function properly. Roads and streets should be properly graded to reduce frost-action damage. This soil provides good sites for excavated ponds. Capability subclass IIIw; woodland suitability subclass 3w.

122A—Colp silt loam, 0 to 3 percent slopes. This nearly level to very gently sloping, moderately well drained soil is on broad convex ridgetops and on low knolls. Individual areas of this soil are irregular or rounded in shape and range from 2 to about 150 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsurface layer is light brownish gray silt loam about 5 inches thick. The subsoil is about 48 inches thick. In the upper 4 inches it is mixed light brownish gray and yellowish brown light silty clay loam, the next 29 inches is mottled yellowish brown silty clay, and the lower part is mottled light brownish gray silty clay.

Included with this soil in mapping are a few sandy areas, a few short, steep terrace breaks, a few mine sinks, and a few severely eroded areas on knolls. Also included are a few areas of St. Charles and Hurst soils. St. Charles soils are on slightly higher positions above terrace breaks, and Hurst soils are in low-lying areas or at the head of drainageways. Some areas of Colp soils that have 3 to 7 percent slopes are also included on knolls and along side slopes. Inclusions make up about 5 to 10 percent of this unit.

Water and air move through this soil at a slow rate, and surface runoff is slow to medium. Reaction ranges from extremely acid to medium acid in the subsoil and varies widely in the surface layer as a result of local liming practices. The surface layer is friable and easily tilled but tends to crust after hard rains. Organic-matter content is low, and available water capacity is moderate to high.

Most areas of this soil are farmed. The soil has fair potential for cultivated crops, hay, pasture, and trees. The potential for recreation uses is fair to good, the potential for wildlife is mostly good, and the potential for most engineering uses is poor.

This soil is suited to corn, soybeans, grain sorghum, wheat, and grasses and legumes. The main concerns of management are removing excess water and improving tilth. Shallow ditches adequately remove excess water, and returning crop residue to the surface improves tilth. Available water often is not sufficient for plant growth, and crops that are somewhat tolerant of drought should be favored.

Grasses and legumes grow well if the soil is properly fertilized and excess water is removed. Some winter damage resulting from frost heave is likely in the undrained areas.

This soil is suited to trees, and some areas remain in native hardwoods. There are no hazards or limitations if adapted species are planted. Harvesting trees is restricted by wetness during some periods.

This soil is not well suited to building site development because of shrink-swell potential. It is suited to sewage lagoons for onsite waste disposal. Capability subclass IIw; woodland suitability subclass 3o.

122B2—Colp silt loam, 3 to 7 percent slopes, eroded. This gently sloping, moderately well drained soil is on narrow ridgetops, knolls, and side slopes. Individual areas of this soil are irregular or elongated in shape and range from 2 to about 50 acres in size.

Typically, the surface layer is grayish brown silt loam that has been mixed with some yellowish brown silty clay loam subsoil material. It is about 6 inches thick, but ranges from 4 to 9 inches thick over most of the area. The subsoil is about 46 inches thick. In the upper 2 inches it is mixed light brownish gray and yellowish brown light silty clay loam; the next 27 inches is mottled yellowish brown silty clay; and the lower part is mottled light brownish gray silty clay. The substratum to a depth of about 60 inches is mottled light brownish gray silty clay. In some places the subsoil is thinner and the calcareous substratum is within 40 inches. In these places the substratum is layered silt loam, silty clay loam, and silty clay. In places where this soil remains in native hardwoods, the surface layer is not eroded and is dark grayish brown. In these places the surface layer is underlain by a thin, pale brown subsurface layer.

Included with this soil in mapping are a few sandy areas, a few areas of short, steep terrace breaks, and a few small severely eroded areas on side slopes. Also included are a few areas of St. Charles and Hurst soils. St. Charles soils are on knolls and terrace breaks, and Hurst soils are at the head of drainageways. Inclusions make up about 5 percent of this unit.

Water and air move through this soil at a slow rate, and surface runoff from cultivated areas is medium. Reaction ranges from extremely acid to medium acid in the subsoil and varies in the surface layer because of local liming practices. The surface layer is friable to firm and tends to crust or puddle after hard rains. Organic-matter content is low, and available water capacity is moderate to high.

Most areas of this soil are farmed. This soil has fair potential for cultivated crops, hay, pasture, and trees. It has fair to good potential for recreational uses, good potential for openland and woodland wildlife, and poor potential for most engineering uses.

This soil is suited to corn, soybeans, grain sorghum, wheat, and grasses and legumes. Controlling erosion is the main problem, but poor tilth and low fertility are also problems. Erosion can be reduced by minimum tillage, winter cover crops, and grassed waterways. Crop rotation and zero tillage will reduce erosion and improve tilth. Lime and fertilizers, particularly nitrogen, are needed to promote good growth. Returning crop residue to the soil or regularly adding other organic material improves fertility, reduces crusting, and increases water intake.

The use of the soil for pasture or hay is also effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction, excessive runoff, and poor tilth. Fertilizers are needed to promote good growth of grasses and legumes.

This soil is not well suited to building sites because it is clayey. It has a high shrink-swell potential and is difficult to excavate. Sewage lagoons can be installed with a minimum of land shaping. Capability subclass IIIe; woodland suitability subclass 3o.

122C2—Colp silt loam, 7 to 12 percent slopes, eroded. This sloping, moderately well drained soil is on narrow ridgetops and side slopes along drainageways and above bottom lands. Individual areas of this soil are mostly irregular in shape and range from 4 to about 60 acres in size.

Typically, the surface layer is grayish brown silt loam with some yellowish brown silty clay loam. It is typically about 6 inches thick, but ranges from 4 to 8 inches in thickness over most of the area. The subsoil is about 46 inches thick. In the upper 2 inches it is mixed light brownish gray and yellowish brown light silty clay loam;

the next 29 inches is mottled yellowish brown silty clay; and the lower part is mottled light brownish gray silty clay. The substratum to a depth of about 60 inches is mottled light brownish gray in layers of silty clay loam and silty clay. In some places the subsoil is thinner and the calcareous substratum is within 40 inches of the surface. In wooded areas the surface layer is darker and is underlain by a thin, pale brown silt loam subsurface layer.

Included with this soil in mapping are a few sandy areas, a few areas of short, steep terrace breaks, a few wet areas, and a few severely eroded areas on side slopes. Also included are a few areas of St. Charles, Hurst, and Okaw soils. The St. Charles soils are on the less sloping parts of side slopes above Colp soils, Hurst soils are at the head of drainageways, and Okaw soils are in sloping areas of low terraces. Inclusions make up about 5 to 10 percent of this unit.

Water and air move through this soil at a slow rate, and surface runoff from cultivated areas is medium to rapid. Reaction ranges from extremely acid to medium acid in the subsoil and varies in the surface layer because of local liming practices. The surface layer is friable to firm and tends to crust or puddle after hard rains. Organic-matter content is low, and available water capacity is moderate to high.

Most areas of this soil are farmed. This soil has poor to fair potential for cultivated crops and fair potential for hay, pasture, and trees. It has fair potential for recreational uses, good potential for openland and woodland wildlife, and poor potential for most engineering uses.

This soil is suited to corn, soybeans, grain sorghum, wheat, and grasses and legumes. Erosion, tilth, and fertility are problems that affect use and management. Crop rotation, zero tillage, and minimum tillage help reduce erosion and also improve tilth. Lime and fertilizers, particularly nitrogen, are needed to promote good growth. Crops that are somewhat tolerant of drought are best adapted to this soil because the water supply is often not adequate for good plant growth. Returning crop residue or other organic materials to the soil improves fertility, reduces surface crusting, and increases water intake.

Grasses and legumes grow well on this soil if properly fertilized, and they help in controlling erosion and improving tilth. Lime and nitrogen are particularly needed to promote good growth. Grazing on this sloping soil during wet periods should be restricted to keep the pasture and soil in good condition.

This soil is suited to trees, and some areas remain in native hardwoods. There are no hazards or limitations to be concerned about when planting adapted species.

This soil is not well suited to building sites because of slope and shrink-swell potential. Capability subclass IVe; woodland suitability subclass 3o.

122C3—Colp silty clay loam, 7 to 15 percent slopes, severely eroded. This sloping, moderately well drained soil is on side slopes along drainageways and on hillsides at terrace breaks. Individual areas of this soil are irregular or elongated in shape and range from 2 to about 100 acres in size.

Typically, the surface layer is yellowish brown silty clay loam about 4 inches thick. It ranges from 1 to about 5 inches in thickness over most of the area. The subsoil is about 40 inches thick. In the upper part it is mottled yellowish brown silty clay; the lower part is mixed light brownish gray and yellowish brown silty clay with silty clay loam layers. The substratum to a depth of about 60 inches is mottled light brownish gray in layers of silty clay, silty clay loam, and silt loam. In some places the subsoil is thinner and the calcareous substratum is within 40 inches of the surface. In other places the upper part of the subsoil is light brownish gray.

Included with this soil in mapping are a few sandy areas; a few areas of short, steep slopes, and escarpments; and areas of St. Charles, Okaw, and alluvial soils. St. Charles soils are in less sloping areas at the head of drainageways and on the upper parts of some side slopes with Colp soils. Okaw soils that have similar slopes are on low terraces, and the alluvial soils are along the narrow drainageways. Also included on side slopes along drainageways are areas of Colp soils that are less sloping or steeper than this soil. Inclusions make up 10 to 15 percent of this unit.

Water and air move through this soil at a slow rate, and surface runoff from cultivated areas is rapid to very rapid. The subsoil ranges from extremely acid to medium acid, and the surface layer varies widely in reaction because of local liming practices and erosion. The surface layer is firm and difficult to till. Clods form if it is worked when wet, and a crust forms after hard rains. Some seepage is likely from the layered materials. Organic-matter content is very low, and available water capacity is moderate.

Most areas of this soil are farmed. This soil has poor potential for most cultivated crops and poor to fair potential for hay, pasture, and trees. Its potential for most recreation uses is poor, for wildlife it is fair, and for most engineering uses it is poor.

This soil is not well suited to row crops, but it is suited to wheat grown in rotation with grasses and legumes. This soil has been seriously damaged by erosion. Improving tilth and fertility and controlling erosion are major problems. Erosion can be reduced by minimum tillage and grassed waterways. In a few areas slopes are uniform and long enough to be stripcropped or contour farmed. Most of the fertility has been lost because of erosion, and additions of lime and fertilizers, particularly nitrogen, are necessary to promote good growth on this acid soil. Tilth can be improved by returning organic matter or crop residue to the surface layer.

This soil is best suited to hay and pasture. Legumes and grasses, once established, help in controlling erosion and rebuilding the soil. Fertilizers must be added to promote good growth. Seeding a nurse crop of wheat is the best way to establish a stand. Proper stocking rates, pasture rotation, and restricted use during wet periods maintain the pasture and protect it from erosion.

This soil is suited to trees, but the growth rates are only fair. The problems include seedling mortality, equipment limitations, and an erosion hazard. Pine trees are best adapted, and hand planting will reduce seedling mortality. Because the clayey soil is sticky when wet, planting and harvesting equipment can be used only during dry periods. Trees grow so slowly that they should be interplanted with a cover crop to protect the soil from erosion.

This soil is not suitable for building sites because of slopes and shrink-swell potential. Most slopes need to be reshaped to be used for building sites. Capability subclass VIe; woodland suitability subclass 3r.

122D—Colp silt loam, 12 to 20 percent slopes. This strongly sloping to moderately steep, moderately well drained soil is on side slopes along drainageways and on hillside terrace breaks. Individual areas of this soil are elongated to irregular in shape and range from 4 to about 75 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 3 inches thick. It is underlain by a pale brown subsurface layer about 4 inches thick. The subsoil is about 40 inches thick. In the upper part it is mottled yellowish brown silty clay; the lower part is mottled light brownish gray silty clay and silty clay loam. The substratum to a depth of about 60 inches is mottled light brownish gray in layers of silty clay, silty clay loam, and silt loam. In some places the subsoil is thinner and the calcareous substratum is within 40 inches of the surface.

Included with this soil in mapping are a few areas of short, steep slopes and a few severely eroded areas. Also included are a few areas of St. Charles soils along the upper part of some side slopes, some areas of alluvial soils along the bottom of narrow drainageways, a few areas of Camden soils on the upper part of side slopes, and a few areas of gently sloping Okaw soils on low terraces. Inclusions make up about 15 percent of this unit.

Water and air move through this soil at a slow rate, and surface runoff is rapid to very rapid. Reaction ranges from extremely acid to medium acid in the subsoil and varies in the surface layer because of local liming practices. The surface layer is friable to firm and, if cultivated, tends to crust or puddle after hard rains. Organic-matter content is low, and available water capacity is moderate to high.

Most areas of this soil are pastured or in native hardwoods. This soil has poor potential for cultivated crops, poor to fair potential for hay, and fair potential for pasture and trees. Its potential for most recreational uses is fair to poor, potential for openland and woodland wildlife is mostly good, and potential for most engineering uses is poor.

This soil is suited to grasses and legumes grown for hay and pasture. The erosion hazard and slope limit the use of this soil. If the soil is used for cultivated crops, erosion is difficult to control but can be reduced by minimum tillage, winter cover crops, and grassed waterways.

This soil is suited to trees, and many of the steeper areas remain in native hardwoods. Management concerns include the erosion hazard and equipment limitations. Because surface runoff is rapid to very rapid, areas planted to trees erode quickly unless protected by a cover crop. Slopes limit use of equipment in planting and harvesting, and some areas need hand planting.

This soil is not well suited to building sites or onsite waste disposal systems because it is steep and clayey. Capability subclass VIe; woodland suitability subclass 3r.

131B—Alvin very fine sandy loam, 1 to 7 percent slopes. This nearly level to gently sloping, moderately well drained or well drained soil is on broad and narrow convex ridgetops and on side slopes at the head of drainageways. Individual areas of this soil are irregular in shape and range from 5 to 200 acres in size.

Typically, the surface layer is dark brown very fine sandy loam about 7 inches thick. The subsurface layer is brown and dark brown very fine sandy loam about 4 inches thick. The subsoil is about 38 inches thick. In the upper part it is dark yellowish brown loam about 12 inches thick; the next 5 inches is dark brown loam; and the lower 21 inches is dark brown fine sandy loam that grades to loamy fine sand with depth. The substratum to a depth of about 64 inches is mixed yellowish brown and light yellowish brown fine sand. In some places the surface layer is fine sandy loam or loam; or the subsoil has clay loam layers; or there is no subsurface layer, and the surface layer contains some subsoil material.

Included in mapping are areas of short, steep slopes; escarpments; and areas that have mottles and gray colors in the upper part of the subsoil and in the subsurface layer. Also included are areas of soil that is coarse textured and more subject to wind erosion, such as that on the high ridge at Sand Ridge. Inclusions make up about 5 percent of the unit.

Water and air move through this soil at a moderate or moderately rapid rate, and surface runoff from cultivated areas is slow. Reaction ranges from very strongly acid to medium acid in the subsoil and varies widely in the surface layer as a result of local liming practices. The surface layer is very friable and easily tilled throughout a wide range in moisture content. This soil dries quickly after rains and is workable early in spring. Organic-matter content is low, and available water capacity is moderate.

Most areas of this soil are farmed. This soil has fair to good potential for cultivated crops, hay, pasture, special crops, and trees; good potential for most recreational and wildlife uses; and good potential for most engineering uses.

This soil is suited to corn, soybeans, grain sorghum, small grain, and grasses and legumes grown for hay and pasture. If the soil is used for cultivated crops, there is a hazard of wind and water erosion. Minimum tillage, zero tillage, and winter cover crops help prevent excessive soil loss. In a few areas slopes are long enough or smooth enough to be stripcropped on the contour. Returning crop residue to the soil or regularly adding organic material

improves fertility, reduces wind erosion, and increases water intake.

This soil is well suited to certain special crops, such as muskmelons and watermelons. It is suited to early vegetable gardens. It is not well suited to late gardens, because in most years it is droughty during summer. Fertilizers should be added in several small applications rather than at one time. Irrigation is desirable if a supply of water is available.

This soil is well suited to hay and pasture, which help to control erosion. It is especially well suited to alfalfa if fertilizers are added. During the dry years, summer and fall growth are reduced, and fields must be protected from overgrazing or cutting to maintain adequate cover.

This soil is suited to trees, and a few areas remain in native hardwoods. Controlling plant competition is the main management problem. Competition of undesirable plants can be controlled by proper site preparation, spraying, cutting, or girdling.

This soil is well suited to building site development and onsite septic-tank absorption fields. There is a hazard of contamination of wells if they are not sealed. Soil materials are generally good for building roads, streets, and sidewalks if adequate surface drainage is provided. Ponds and excavated areas are likely to seep because of the coarse texture. Capability subclass IIe; woodland suitability subclass 2o.

131C3—Alvin loam, 7 to 15 percent slopes, severely eroded. This sloping to strongly sloping, moderately well drained or well drained soil is on narrow ridgetops, on knolls, and on side slopes along drainageways. Individual areas of this soil are irregular or rounded in shape and range from 4 to 40 acres in size.

Typically, the surface layer is dark yellowish brown loam about 5 inches thick. The subsoil is about 34 inches thick. In the upper part it is dark yellowish brown and dark brown loam, and the lower part is dark brown fine sandy loam that grades to loamy fine sand with depth. The substratum to a depth of about 60 inches is yellowish brown and light yellowish brown fine sand. In some places where the original surface layer has not been completely removed by erosion, the surface color is dark brown. In other places the surface layer is very fine sandy loam or fine sandy loam. In some places the subsoil contains more clay and has clay loam in the upper part.

Included with this soil in mapping are areas of Alvin soil that has moderately steep slopes along drainageways. A few areas of Colp soils are on the lower part of some side slopes. Inclusions make up about 15 percent of this unit.

Water and air move through this soil at a moderate or moderately rapid rate, and surface runoff from cultivated areas is medium. Reaction ranges from very strongly acid to medium acid in the subsoil and varies in the surface layer as a result of local liming practices. The surface layer is friable and easily tilled. This soil dries quickly after rains and is workable early in spring. The surface layer has a tendency to crust or puddle after rains because of very low organic-matter content and poor structure. Available water capacity is moderate.

Most areas of this soil are farmed. This soil has fair potential for cultivated crops, hay, pasture, and trees, fair potential for most recreational uses, mostly fair to good potential for wildlife, and fair potential for most engineering uses.

This soil is suited to corn, soybeans, grain sorghum, wheat, and grasses and legumes grown for hay and pasture. Erosion is the main hazard, but the limited amount of water available for crops is also a problem. Erosion can be reduced by minimum tillage, by planting winter cover crops, and by rotating crops. Crops should be drought tolerant or should mature before the hot, dry period. Zero tillage conserves water and reduces erosion. Also, the regular addition of organic material to the surface reduces crusting and increases water intake.

The use of the soil for hay or pasture helps in controlling erosion. Grasses and legumes grow well if properly fertilized. Proper stocking rates, pasture rotation, and timely deferment of grazing during dry periods help to keep the pasture and soil in good condition.

This soil is well suited to trees, and seedlings grow well if competing vegetation is controlled. Proper site preparation or spraying adequately controls unwanted vegetation. There are no other hazards to planting or harvesting trees.

This soil is not well suited to building site development or onsite waste disposal systems because of slope. Leveling is likely to expose the more sandy substratum, which is difficult to vegetate because of low available water capacity and summer droughtiness. Capability subclass IVe; woodland suitability subclass 2o.

131E—Alvin very fine sandy loam, 12 to 25 percent slopes. This strongly sloping to moderately steep, moderately well drained and well drained soil is on side slopes along drainageways and on hillsides above terrace breaks. Individual areas of this soil are mostly elongated in shape and range from about 10 to 40 acres in size.

Typically, the surface layer is dark brown very fine sandy loam about 5 inches thick. The subsurface layer is brown very fine sandy loam about 5 inches thick. The subsoil is about 35 inches thick. The upper part of the subsoil is dark yellowish brown loam, the middle part is brown loam which grades to fine sandy loam with depth, and the lower part is brown loamy fine sand. The substratum to a depth of about 64 inches is mixed yellowish brown and light yellowish brown fine sand. In some places the surface layer is loam, silt loam, or fine sandy loam.

Included with this soil in mapping are a few areas of the more clayey Colp soils on the lower part of some side slopes and, on the upper parts, a few areas of the more silty Alford soils. A few areas of bedrock outcrops are included along some side slopes and drainageways. Inclusions make up about 10 percent of this unit.

Water and air move through this soil at a moderate or moderately rapid rate, and surface runoff is medium.

Reaction ranges from very strongly acid to medium acid in the subsoil and varies in the surface layer as a result of local liming practices. The surface layer is very friable and dries quickly after rains. Organic-matter content is low, and available water capacity is moderate.

Most areas of this soil are in pasture or trees. This soil has poor to fair potential for cultivated crops and fair potential for hay, pasture, and trees. It has fair to poor potential for recreational uses, fair to good potential for most upland wildlife, and poor potential for most engineering uses.

This soil is suited to grain sorghum, wheat, and grasses and legumes grown for hay and pasture. If the soil is used for cultivated crops, there is a hazard of erosion. Erosion and lack of available water for good plant growth are management problems. Minimum tillage, winter cover crops, and planting on the contour help prevent excessive soil loss. Planting crops that are drought tolerant and adding organic material to the surface layer to increase water intake reduce droughtiness.

This soil is best suited to pasture or hay. Grasses and legumes grow well if properly fertilized and help in controlling erosion. Proper stocking rates, pasture rotation, and timely deferment of grazing during dry periods help to keep the pasture and soil in good condition.

This soil is suited to trees, and some areas remain in native hardwoods. Tree seeds and seedlings survive and grow well if competing vegetation is controlled or removed by proper site preparation, or by spraying, cutting, or girdling. There is a moderate erosion hazard, and the use of equipment is somewhat limited on the steeper slopes. Logging trails and roads erode rapidly but can be protected by planting a cover crop. The sandy surface provides poor traction for trucks and tractors and makes logging operations more difficult.

This soil is not well suited to building sites because of the steepness of slopes. There are no other factors that limit use. Septic tank filter fields function properly if installed on the contour, but there is a hazard of ground water contamination. Capability subclass IVe; woodland suitability subclass 2r.

132—Starks silt loam. This nearly level to very gently sloping, somewhat poorly drained soil is on ridgetops of terraces. Individual areas of this soil are mostly irregular or somewhat rounded in shape and range from about 5 to 100 acres in size.

Typically, the surface layer is grayish brown silt loam about 8 inches thick. The subsurface layer is pale brown silt loam about 3 inches thick. The subsoil is about 41 inches thick. In the upper 20 inches it is yellowish brown silty clay loam with light brownish gray mottles; the next 10 inches is mixed yellowish brown and light brownish gray loam; and the lower 11 inches is mixed light brownish gray and yellowish brown silt loam. The substratum to a depth of 64 inches is gray silt loam. In some places the surface layer is loam or very fine sandy loam. In other places the subsoil is silty clay loam deeper than 40 inches.

Included in mapping are small areas of the poorly drained Sexton soils, small mine-sink areas, small areas of short, steep slope breaks, and small sandy areas. Some areas of the better drained Camden soils on slightly higher rises are also included. Inclusions make up about 5 percent of the unit.

Water and air move through this soil at a moderately slow rate, and surface runoff is slow. Reaction ranges from very strongly acid to medium acid in the subsoil and varies widely in the surface layer as a result of local liming practices. The surface layer is friable and easily tilled, but it tends to crust or puddle after hard rains because of poor structure and low organic-matter content. Available water capacity is high.

Most areas of this soil are farmed. This soil has good potential for cultivated crops, hay, pasture, and trees, fair to good potential for recreational uses and wildlife, and fair to poor potential for most engineering uses.

This soil is suited to corn, soybeans, grain sorghum, small grain, and grasses and legumes grown for hay and pasture. Drainage is needed for optimum growth and increased productivity. Surface drainage by shallow ditching is usually adequate. Tile will function well if spaced at proper intervals. Surface crusting and compaction can be reduced by incorporating crop residue into the soil and by practicing minimum tillage.

This soil is suited to most recreational uses but has a seasonal wetness hazard, which can be alleviated by surface drainage. Areas that are used intensively tend to become very compacted unless a good vegetative cover is maintained. Compaction can be minimized by deferring use during wet periods.

This soil is well suited to development for wildlife. Wet areas and areas adjacent to mine sinks are excellent habitat for wetland plants and wildlife.

This soil is suited to trees, and a few areas remain in native hardwoods. Controlling plant competition is the main management problem. This can be accomplished by site preparation, by spraying, or by cutting or girdling.

Building site development is possible on this soil if proper design and installation procedures are used. Onsite waste disposal systems are not suited because of the seasonal high water table. Proper grading and hauling of suitable base materials can reduce frost action under streets and roads. Footing drain tile should be used to reduce the wetness hazard around foundations. Capability subclass IIw; woodland suitability subclass 2o.

134A—Camden silt loam, 0 to 3 percent slopes. This nearly level to very gently sloping, moderately well drained soil is on broad and narrow ridgetops of terraces. Individual areas of this soil are rounded or irregular in shape and range from about 2 to 60 acres in size.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is about 56 inches thick. In the upper 27 inches it is strong brown silty clay loam, the next 10 inches is strong brown clay loam, and the lower 19 inches is strong brown and yellowish brown fine sandy loam. The substratum to a depth of about 76 inches

is strong brown and yellowish brown loamy fine sand. In some places the surface layer is loam or very fine sandy loam.

Included in mapping are small areas of short, steep slope breaks or escarpments. Also included are areas of soils having a sandy surface layer, a few areas of this Camden soil that are more sloping and severely eroded, and a few areas of the somewhat poorly drained Starks soils. Inclusions make up 2 to 5 percent of the unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is slow. Reaction ranges from very strongly acid to slightly acid in the subsoil and varies widely in the surface layer as a result of local liming practices. The surface layer is friable and easily tilled. Available water capacity is high, and organic-matter content is low.

Most areas of this soil are farmed. This soil has good potential for cultivated crops, hay, pasture, and trees and for most recreational, wildlife, and engineering uses.

This soil is well suited to all crops commonly grown in the county. It is also suited to a wide variety of specialty crops, such as fruits and vegetables. Fertilizers should be added, and crop residue should be incorporated into the surface soil to increase productivity and water intake. Areas with a sandy surface should be protected from blowing by using winter cover crops. In most years this soil can be double cropped. Some of the more sloping areas must be protected from erosion by minimum tillage or zero tillage.

This soil is well suited to trees, and a few areas remain in native hardwoods. A wide variety of trees grow well, and there are few limitations. Plant competition can be controlled by proper site preparation, spraying, or cutting.

Building site development and onsite waste disposal fields are well suited to this soil. Roads and streets should be banked and ditched to reduce the possibility of frost-action damage. Wastes from onsite waste disposal fields can contaminate the water supply if wells are not sealed. Capability class I; woodland suitability subclass 1o.

134B2—Camden silt loam, 3 to 7 percent slopes, eroded. This gently sloping, moderately well drained or well drained soil is on narrow ridgetops and on side slopes along drainageways. Individual areas of this soil are elongated or irregular in shape and range from 2 to about 40 acres in size.

Typically, the surface layer is dark yellowish brown silt loam about 7 inches thick. It ranges from 4 to 8 inches thick over most of the area. The subsoil is about 55 inches thick. The upper part of the subsoil is strong brown silty clay loam, the middle part is strong brown clay loam, and the lower part is strong brown and yellowish brown fine sandy loam. The substratum to a depth of about 76 inches is strong brown and yellowish brown loamy fine sand. In some places the surface layer is loam or very fine sandy loam. In other places the subsoil is not so sandy and is silty clay loam at greater depths. In these places the substratum has layers of loam, silt loam, and silty clay loam.

Included with this soil in mapping are areas that have a sandy surface layer, areas that are severely eroded, and areas of short, steep slopes or escarpments. A few areas of the more sandy Alvin soils are included where they are associated on the landscape with this Camden soil. Inclusions make up about 5 percent of this unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is medium. Reaction ranges from very strongly acid to slightly acid in the subsoil and varies in the surface layer as a result of local liming practices. The surface layer is friable and easily tilled. It tends to crust after hard rains because of low organic-matter content and the increased amount of subsoil mixed in the surface layer by plowing. Available water capacity is high.

Most areas of this soil are farmed. This soil has good potential for cultivated crops, hay, pasture, and trees and for fruit and some vegetables. It has good potential for most recreational uses and for wildlife and good to fair potential for most engineering uses.

This soil is well suited to corn, soybeans, small grains, and grasses and legumes grown for hay and pasture. There is a hazard of erosion if this soil is used for cultivated crops. Minimum tillage, winter cover crops, and crop rotation help reduce erosion and maintain tilth. In a few areas slopes are favorable for terracing and farming on the contour.

There are no major hazards for pasture or crops once the grasses and legumes are established. Lime and fertilizers are needed to promote good growth, particularly nitrogen.

This soil is suited to orchard crops, strawberries, and a variety of vegetables. The erosion hazard is the main concern of management. It can be controlled in orchards by planting and maintaining a cover crop. Some areas have slopes that are favorable for terracing or farming on the contour. This soil can be irrigated if slopes are protected and water is available.

This soil is well suited to trees, and a few areas remain in native hardwoods. Tree seeds and seedlings survive and grow well if competing vegetation is controlled. There are no other limitations when planting or harvesting trees.

This soil has few limitations that restrict building site development and onsite waste disposal systems. The main concern is controlling erosion in exposed areas. Proper design and installation of footings can eliminate problems of frost action and shrink-swell. Unless wells are sealed, the water supply can be contaminated if the soil is used for onsite waste disposal systems. Capability subclass IIe; woodland suitability subclass 1o.

134C2—Camden silt loam, 7 to 12 percent slopes, eroded. This sloping, moderately well drained or well drained soil is on hillsides along terrace breaks and on side slopes along drainageways. Individual areas of this soil are elongated or irregular in shape and range from 5 to about 40 acres in size.

Typically, the surface layer is dark yellowish brown silt loam about 6 inches thick. It ranges from 3 to 7 inches in thickness over most of the area. The subsoil is about 55 inches thick. The upper part is strong brown silty clay loam. The middle part is strong brown clay loam. The lower part is strong brown and yellowish brown fine sandy loam. The substratum to a depth of about 76 inches is strong brown and yellowish brown loamy fine sand. In some places the surface layer is loam or very fine sandy loam. In other places the upper part of the subsoil contains more sand. Also, in places the surface layer is not eroded and is dark grayish brown.

Included with this soil in mapping are areas that have a sandy surface layer, a few areas that are severely eroded, and areas of the same soil on short, steep slopes. The more sandy Alvin soils and the more clayey St. Charles soils are also included in a few areas where they are associated with this Camden soil on the landscape. Inclusions make up about 5 percent of this unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is medium. Reaction ranges from very strongly acid to slightly acid in the subsoil and varies in the surface layer as a result of local liming practices. The surface layer is friable and easily tilled. It tends to crust after hard rains because of low organic-matter content and the increase in clay resulting from mixing of the subsoil by plowing. Available water capacity is high.

Most areas of this soil are farmed. This soil has fair to good potential for cultivated crops, hay, pasture, trees, and orchard crops. The potential for most recreation uses is fair, for most wildlife uses it is fair to good, and for most engineering uses it is fair.

This soil is suited to corn, soybeans, small grain, and grasses and legumes. If the soil is used for cultivated crops, there is a hazard of erosion. Minimum tillage, winter cover crops, and grassed waterways help prevent excessive soil loss. Returning crop residue or regularly adding other organic material helps to improve fertility, reduce crusting, and increase water intake.

The use of the soil for pasture or hay helps in controlling erosion. Legumes and grasses grow well if properly fertilized.

This soil is well suited to trees, and some areas remain in native hardwoods. Tree seeds and seedlings grow well if competing vegetation is controlled or removed. There are no other limitations.

This soil is suitable for building sites if limitations of slope are overcome. Proper design and installation, along with some reshaping of slopes, are necessary. Exposed areas erode rapidly, but they will revegetate quickly if properly fertilized and seeded. Wells for water supply should be sealed to prevent possible contamination from waste filter fields. Capability subclass IIIe; woodland suitability subclass 1o.

134C3—Camden silty clay loam, 7 to 15 percent slopes, severely eroded. This sloping to strongly sloping, moderately well drained or well drained soil is on side slopes along drainageways or on hillsides at terrace breaks. Individual areas of this soil are irregular to elongated in shape and range from about 4 to 60 acres in size.

Typically, the surface layer is dark brown silty clay loam about 5 inches thick. It consists primarily of subsoil material and ranges from 3 to 6 inches in thickness. The subsoil is about 45 inches thick. The upper part is strong brown silty clay loam. The middle part is strong brown clay loam. The lower part is mixed brown, yellowish brown, and light brownish gray layers of fine sandy loam, loam, and silt loam. The substratum to a depth of about 60 inches is mixed brown, yellowish brown, and light brownish gray layers of fine sandy loam and loam. In some places layers of light silty clay occur in the subsoil and substratum.

Included in mapping are areas of similar soils that have short, steep slopes and a few areas that have a sandy surface layer; areas of the more sandy Alvin soils that are associated with this Camden soil on the landscape; and, along the bottoms of the narrow drains, areas of silty alluvial soils that are too small to separate in mapping. Areas of this Camden soil with steeper slopes along drainageways are also included. Inclusions make up about 15 percent of this unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is rapid. Reaction ranges from very strongly acid to slightly acid in the subsoil and varies in the surface layer as a result of erosion and local liming practices. The surface layer is firm and somewhat difficult to till. Clods form if this soil is worked when wet. This soil crusts or puddles after rains because of the very low organic-matter content, poor structure, and the increase in clay content resulting from mixing of the subsoil by plowing. Available water capacity is high.

Most areas of this soil are farmed. This soil has fair potential for cultivated crops and fair to good potential for hay, pasture, and trees. The potential for most recreation uses is fair, for most wildlife uses it is fair to good, and for most engineering uses it is fair.

This soil is suited to corn, soybeans, grain sorghum, wheat, and legumes and grasses. Erosion is the main management concern. Other concerns are improving tilth and rebuilding fertility. Row crops are not suited unless they are part of a crop rotation system. Zero tillage, minimum tillage, and grassed waterways help prevent excessive soil loss. A few areas have slopes favorable for contour stripcropping. Returning crop residue to the surface or regularly adding other organic material helps reduce crusting and increases water intake and improves fertility.

Pasture and hay are also suited. Once established, grasses and legumes grow well. Applications of lime and fertilizers, particularly nitrogen, according to soil tests will greatly improve growth and yields from this soil. Restricted use during wet periods helps to keep the pasture and soil in good condition.

This soil is well suited to trees if competing vegetation is controlled by proper site preparation or by spraying. There are no hazards to planting or harvesting trees.

Building sites are limited on this soil by slope. The somewhat clayey, sticky surface layer requires special attention if vegetation is to grow adequately. Fertilizers, especially lime and nitrogen, are needed for adequate growth. Wells should be sealed to prevent contamination of well water by onsite waste disposal systems. Capability subclass IVe; woodland suitability subclass 1o.

134D—Camden silt loam, 12 to 18 percent slopes. This strongly sloping, moderately well drained or well drained soil is on hillsides of terrace breaks and along drainageways. Individual areas of this soil are irregular or elongated in shape and range from about 4 to 80 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 4 inches thick. The subsurface layer is yellowish brown silt loam about 5 inches thick. The subsoil is about 50 inches thick. The upper part is strong brown silty clay loam. The middle part is strong brown clay loam. The lower part is mottled, brown and yellowish brown layers of fine sandy loam, loam, and silt loam. The substratum to a depth of about 70 inches is mottled, brown and yellowish brown fine sandy loam and loam. In some places layers of light silty clay occur in the subsoil and substratum. In cultivated areas the surface layer is dark brown silt loam.

Included with this soil in mapping are small sandy areas and areas where bedrock crops out along slopes or drainageways. Also included are areas of the more sandy Alvin soils that are associated with this Camden soil on the landscape. Inclusions make up 2 to 5 percent of this unit.

Water and air move through this soil at a moderate rate, and surface runoff is rapid. Reaction ranges from very strongly acid to slightly acid. The surface layer is friable. Organic-matter content is low, and available water capacity is high.

Most areas of this soil are in native hardwoods or in pasture. This soil has fair potential for cultivated crops and fair to good potential for hay, pasture, and trees. The potential for recreation uses is fair to poor, for most wildlife uses it is fair to good, and for most engineering uses it is fair to poor.

This soil is suited to corn, grain sorghum, small grain, and grasses and legumes for hay and pasture. If this soil is used for cultivated crops, there is a hazard of erosion. Crop rotation, minimum tillage, and zero tillage help prevent excessive soil loss. A few areas have slopes that are long enough and smooth enough to be terraced and farmed on the contour.

The use of this soil for pasture or hay helps in controlling erosion. Clipping or spraying is necessary to control competing plants.

This soil is well suited to trees if plant competition is controlled or removed by site preparation, by spraying, or by cutting or girdling.

This soil is not well suited to building site development or onsite waste disposal systems because of steepness of slopes and the erosion hazard. Some slope reshaping can overcome the limitation of slope. Exposed areas will quickly revegetate if properly shaped, fertilized, and seeded. Onsite waste disposal systems may cause contamination of water supplies where wells are unsealed. Capability subclass IVe; woodland suitability subclass 1r.

162—Gorham silty clay loam. This nearly level, poorly drained soil is on low, flat ridges on bottom lands. Individual areas are mostly elongated in shape and range from about 5 to 100 acres in size.

Typically, the surface layer is very dark gray silty clay loam in the upper 8 inches and very dark grayish brown heavy silty clay loam in the lower 5 inches. The subsoil is 39 inches thick. The upper 13 inches is dark grayish brown light silty clay. The next 4 inches is dark grayish brown silty clay loam. The next 9 inches is dark yellowish brown clay loam, which becomes more sandy with depth. Below that is 7 inches of grayish brown sandy loam. The lower 6 inches of the subsoil is very dark grayish brown loamy very fine sand. The substratum to a depth of 60 inches is very dark grayish brown or yellowish brown in layers of sandy loam, loamy very fine sand, and fine sand. In many places the upper part of the subsoil is silty clay loam and contains more brown colors. In other places the subsoil and the substratum to a depth of 60 inches are silty clay loam.

Included with this soil in mapping are areas of sandy overwash. Also included are areas of the more clayey Darwin and Cairo soils in swales and narrow channels. Inclusions make up about 5 percent of the unit.

Water and air move through the upper part of this soil at a moderately slow rate and at a moderate rate in the more sandy lower part. Surface runoff is slow. Reaction ranges from strongly acid to neutral in the subsoil and varies widely in the surface layer as a result of local liming practices. The surface layer is firm and somewhat difficult to work when wet. This soil has a seasonal high water level. Organic-matter content is medium, and available water capacity is high.

Most areas of this soil are farmed. This soil has fair to good potential for cultivated crops, hay, pasture, and trees, poor potential for recreational use, fair to good potential for most wildlife uses, and poor potential for most engineering uses.

This soil is suited to corn, soybeans, small grain, and grasses and legumes for hay and pasture if protected from flooding. Seasonal wetness limits choice of plants in some years and can be reduced by surface ditching. The water level can be lowered by tile if an outlet is available. Surface tilth and workability can be improved by fall plowing. Minimum tillage and returning crop residue help to reduce compaction and improve fertility.

The use of this soil for pasture or hay is not extensive. Choice of plants is limited by wetness, and some areas are severely damaged. Restricted use during wet periods helps keep pasture and soil in good condition.

This soil is generally unsuited to building sites or onsite waste disposal systems because of flooding and wetness hazards. Roads and streets need special design to reduce the wetness and frost action hazards. Capability subclass IIw; woodland suitability subclass 2w.

164A—Stoy silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on broad upland divides or at the head of drainageways. Individual areas of this soil are irregular or rounded in shape and range from about 2 to 125 acres in size.

Typically, the surface layer is dark grayish brown and brown silt loam about 8 inches thick. It is underlain by a yellowish brown silt loam subsurface layer about 6 inches thick. The subsoil is about 42 inches thick. The upper part is yellowish brown heavy silt loam mixed with pale brown. The next layer is mottled yellowish brown silty clay loam. Below that is strong brown, dark brown, and light brownish gray silty clay loam. The lower part is firm and slightly brittle, dark yellowish brown and light brownish gray silt loam. The substratum to a depth of about 64 inches is mottled yellowish brown silt loam. In some places the firm and slightly brittle zone is in the substratum.

Included with this soil in mapping are a few areas of Hosmer and Weir soils. Hosmer soils are on slightly higher knolls, and Weir soils are in depressions or low-lying positions. A few areas of this Stoy soil on steeper slopes are also included. Inclusions make up 2 to 5 percent of this unit.

Water and air move through this soil at a slow rate, and surface runoff from cultivated areas is slow. Reaction ranges from extremely acid to strongly acid in the subsoil and varies widely in the surface layer as a result of local liming practices. The surface layer is friable and easily tilled but has a tendency to crust or puddle after hard rains. Root development and downward water movement are somewhat restricted by the platy subsurface layer. Organic-matter content is low, and available water capacity is high.

Most areas of this soil are farmed. This soil has good potential for cultivated crops, hay, pasture, and trees. The potential for recreation uses is fair, for wildlife uses it is fair to good, and for most engineering uses it is fair to poor.

This soil is suited to corn, soybeans, grain sorghum, wheat, and grasses and legumes if the wetness hazard is reduced. Sufficient drainage can be provided by ditches. Surface tilth and the platy subsurface layer also are management concerns. Tilth can be improved by reducing tillage and by adding crop residue or other organic material to the surface. The platy subsurface layer can be disrupted by deep plowing, by chisel plowing, or by adding deep-rooting legumes to the cropping system.

Grasses and legumes grow well if properly fertilized and maintained. There is a risk of winter damage to the stand by frost heaving, which can be minimized by removing excess surface water with ditches. Grazing when this soil is wet will cause surface compaction and poor tilth.

This soil is suited to trees, and some areas remain in native hardwoods. There are no hazards or limitations to be concerned about.

This soil is suited to building sites if wetness and shrink-swell problems are removed or controlled by proper design or installation of foundations, footings, and footing drain tile. Sewage lagoons can be installed for onsite waste disposal. Capability subclass IIw; woodland suitability subclass 3o.

164B—Stoy silt loam, 2 to 4 percent slopes. This gently sloping, somewhat poorly drained soil is on undulating ridgetops, side slopes along drainageways, and foot slopes. Individual areas of this soil are irregular or elongated in shape and range from 2 to about 150 acres in size.

Typically, the surface layer is mixed dark grayish brown and brown silt loam about 8 inches thick. It is underlain by a yellowish brown silt loam subsurface layer about 6 inches thick. The subsoil is about 42 inches thick. The upper part is mixed yellowish brown, pale brown, and light brownish gray silt loam. The next layer is mottled yellowish brown and light brownish gray silty clay loam. Below that is strong brown, dark brown, and light brownish gray silty clay loam. The lower part is firm and slightly brittle, dark yellowish brown and light brownish gray silt loam. The substratum to a depth of about 64 inches is mottled yellowish brown silt loam. In some places the firm and slightly brittle zone extends into the substratum.

Included with this soil in mapping are a few small areas of short, steep slopes, a few depressions in wet areas, and a few severely eroded areas. Also included are a few areas of the poorly drained Weir soils on ridgetops, mainly at the head of drainageways; some areas of the better drained Hosmer soils along side slopes; and a few areas of more sloping Stoy soils along drainageways. Inclusions make up about 5 percent of this unit.

Water and air move through this soil at a slow rate, and surface runoff from cultivated areas is medium. Reaction in the subsoil ranges from extremely acid to strongly acid. The surface layer is friable and easy to till but tends to crust or puddle because of low organic-matter content and poor surface structure. Available water capacity is high.

Most areas of this soil are farmed. This soil has good potential for cultivated crops, hay, pasture, and trees. It has fair potential for recreation uses, good potential for openland and woodland wildlife, and fair to poor potential for most engineering uses.

This soil is suited to corn, soybeans, grain sorghum, wheat, and grasses and legumes for hay and pasture. If this soil is used for cultivated crops, there is a hazard of erosion. Minimum tillage, grassed waterways, and winter cover crops help prevent excessive soil loss. A few areas have slopes that are long enough and smooth enough to be farmed on the contour. Crusting and compaction of the surface layer and poor penetration of the subsurface layer by roots and water are additional problems. Crust-

ing and compaction can be reduced by crop rotation and reduced tillage and by incorporating organic matter into the surface layer. Disrupting the platiness of the subsurface layer by deep tilling or chisel plowing increases downward water movement and root growth.

The use of this soil for hay or pasture helps in controlling erosion. Overgrazing or cutting when the soil is wet will cause surface compaction and increase runoff. Timely deferment of grazing during wet periods helps keep the crop and the soil in good condition.

This soil is suited to trees, and a few areas remain in native hardwoods. Although growth rates are somewhat slow, there are no serious hazards to be concerned with after an adequate stand is established to limit erosion.

This soil is not well suited to building site development or absorption field waste disposal systems because of slow permeability and wetness. Sewage lagoons can be safely installed in the lesser sloping areas without much difficulty, although some reshaping of slopes is normally required. Surface drainage will eliminate much of the excess water, and footing drain tile should be installed to remove additional water from around foundations. Capability subclass IIe; woodland suitability subclass 3o.

164C2—Stoy silt loam, 4 to 7 percent slopes, eroded. This sloping, somewhat poorly drained soil is on side slopes along drainageways. Individual areas of this soil are irregular to elongated in shape and range from 2 to about 50 acres in size.

Typically, the surface layer is brown silt loam about 6 inches thick. It ranges from 4 to 8 inches in thickness over most of the area. The subsoil is about 37 inches thick. The upper part is mottled yellowish brown silty clay loam. The next layer is strong brown, dark brown, and light brownish gray silty clay loam. The lower part is firm and slightly brittle, dark yellowish brown and light brownish gray silt loam. The substratum to a depth of about 60 inches is mottled yellowish brown silt loam. In some places the upper part of the substratum is firm and slightly brittle.

Included with this soil in mapping are a few small wet areas and a few areas that are severely eroded. Also included are some less sloping areas of the same soil at the head of drainageways, a few areas of the better drained Hosmer soils in strongly sloping areas, and some small areas of alluvial soils along drainageways. Inclusions make up 5 to 10 percent of this unit.

Water and air move through this soil at a slow rate, and surface runoff from cultivated areas is medium. Reaction in the subsoil ranges from extremely acid to strongly acid and varies in the surface layer as a result of local liming practices. The surface layer is friable to firm and somewhat difficult to till. It tends to crust or puddle after hard rains because of increased clay content, poor structure, and low organic-matter content. Available water capacity is high.

Most areas of this soil are farmed. This soil has fair potential for cultivated crops and good potential for hay, pasture, and trees. The potential for recreation uses is fair, for openland and woodland wildlife uses it is fair to good, and for most engineering uses it is fair to poor.

This soil is suited to corn, soybeans, grain sorghum, wheat, and legumes and grasses for hay and pasture. Protecting this soil from further erosion, low fertility, and poor tilth are the main concerns of management. Erosion can be reduced by minimum tillage, winter cover crops, and grassed waterways. Areas having uniform slopes can be contoured. Zero tillage and crop rotations will protect the soil and improve tilth. This soil responds well to additions of lime and fertilizers, in particular nitrogen. Returning crop residue or regularly adding other organic material helps to improve fertility, reduce crusting, and increase water intake.

The use of this soil for pasture or hay helps in controlling erosion. Grasses and legumes grow well if fertilizers are added as they are needed. Restricted use of pastures during wet periods helps to keep the pasture and soil in good condition.

This soil is well suited to trees, and tree seeds and seedlings adapted to the soil grow well. There are no hazards or limitations to be concerned about when planting or harvesting trees.

This soil is suited to building sites only if wetness and shrink-swell problems are overcome. Foundations and footings should be designed to prevent structure damages, and footing drain tile should be used to remove excess water. Capability subclass IIIe; woodland suitability subclass 3o.

165—Weir silt loam. This nearly level, poorly drained soil is on broad upland flats and at the head of drainageways. Individual areas of this soil are mostly rounded or elongated in shape and range from about 3 to 75 acres in size.

Typically, the surface layer is dark grayish brown and grayish brown silt loam about 7 inches thick. The subsurface layer is light brownish gray silt loam about 6 inches thick. The subsoil is about 53 inches thick. The upper 39 inches is light brownish gray silty clay loam with strong brown mottles. The lower 14 inches is light brownish gray silt loam with strong brown and yellowish red mottles. The substratum to a depth of 75 inches is light brownish gray silt loam with strong brown and yellowish red mottles.

Included in mapping are small areas of the somewhat poorly drained Stoy soils on similar slopes. Also included are small depressions that remain wet for extended periods. Inclusions make up about 2 percent of the unit.

Water and air move through this soil at a very slow rate, and surface runoff is slow to ponded. Reaction is extremely acid to medium acid in the subsoil and varies widely in the surface and subsurface layers as a result of local liming practices. The surface layer is friable and easily tilled but remains wet late in the spring. It crusts or puddles after hard rains because of low organic-matter content and poor structure. Available water capacity is high.

Most areas of this soil are farmed. This soil has fair potential for cultivated crops, hay, pasture, and trees, poor potential for most recreational uses, fair to good potential for most wildlife uses, and poor potential for most engineering uses.

This soil is suited to corn, soybeans, grain sorghum, small grain, and grasses and legumes. The wetness hazard and surface crusting are the main concerns of management. The "perched" water can be removed by shallow ditching. Minimum tillage, returning crop residue, and fertilizing will improve yields, build structure, and reduce surface crusting.

Hay and pasture are suited to areas from which excess water has been removed by ditching. Overgrazing or grazing when the soil is too wet will cause surface compaction and reduce water intake. Fertilizer should be applied and only wetness-tolerant grasses and legumes should be planted to maintain stands and to keep the crop growing properly. Winterkill is common in low, undrained areas, and frost heaving affects some plants.

This soil is not well suited to building sites or waste disposal systems with filter tile because of seasonal wetness. Certain types of structures can be built on this soil if properly designed and installed. Sewage lagoons can be built to dispose of septic wastes. Roads, streets, and sidewalks should be ditched and graded to drain excess water and reduce potential frost action. Capability subclass IIIw; woodland suitability subclass 4w.

180—Dupo silt loam. This nearly level, somewhat poorly drained soil is on flood plains or alluvial fans. Individual areas of this soil are elongated or irregular in shape and range from about 5 to 250 acres in size.

Typically, the surface layer is dark brown silt loam about 7 inches thick. The substratum extends to a depth of about 29 inches. The upper 8 inches is mottled brown silt loam. The middle part is grayish brown silt loam with mottles, and the lower 4 inches is dark gray silt loam. Below this is very dark grayish brown silty clay about 5 inches thick. This layer was originally at the surface before it was buried beneath the silty material. The next layer, also part of the original surface, is mottled, very dark gray clay about 16 inches thick. The buried subsoil, extending to a depth of 60 inches, is mottled, very dark gray clay. In some places the buried surface layer is dark gray. Also, in some places there is a silty clay loam layer just above the buried silty clay layer.

Included with this soil in mapping are areas of Darwin soils and areas of Wakeland soils. The Darwin soils are in slightly lower areas and have only a thin silty overwash layer. The Wakeland soils are in slightly higher areas above the Dupo soils and formed entirely in silty materials. Inclusions make up about 10 percent of this unit.

Water and air move through the silty layers at a moderate rate but move slowly through the clayey layers. Surface runoff from cultivated areas is slow. Reaction ranges from medium acid to mildly alkaline in the silty material and from strongly acid to neutral in the clayey material. The surface layer is friable and easily tilled. Root development is restricted by the underlying clayey material and water that "perches" above it. Organic-matter content is low, and available water capacity is high.

Most areas of this soil are farmed. This soil has good potential for cultivated crops, hay, pasture, and trees. The potential for recreational uses is poor to fair, for wildlife uses it is fair to good, and for most engineering uses it is poor.

This soil is suited to corn, soybeans, wheat, and legumes and grasses for hay and pasture. Wetness is the main concern of management. Surface water can be reduced by shallow ditching and the perched water can be removed by tiling if an outlet is available. Overflow water can be diverted and controlled by proper ditching and low levees.

Pasture and hay crops grow well if excess water is reduced. Damage in winter is likely on undrained sites because the frost-heave potential is high. Wetness-tolerant plants should be planted, and the water problem should be eliminated by drainage. Restricting grazing and cutting during wet periods keeps the crop and soil in good condition.

This soil is suited to trees, and if adapted species are planted there are few problems except equipment limitation resulting from wetness. Planting and harvesting of trees will be delayed during the spring.

Building sites and onsite waste disposal systems are not well suited to this soil. Wetness and the overflow hazard limit use. This soil can be drained with ditches and tile. Levees and diversions will protect it from overflow. Capability subclass IIw.

208—Sexton silt loam. This nearly level, poorly drained soil is on broad, flat terrace plains. Individual areas of this soil are irregular or rounded in shape and range from about 5 to 200 acres in size.

Typically, the surface layer is dark grayish brown and grayish brown silt loam about 5 inches thick. The subsurface layer is mottled, grayish brown and light brownish gray silt loam about 10 inches thick. The subsoil is about 42 inches thick. The upper part is mottled, light brownish gray light silty clay loam. The next part is mottled, light brownish gray heavy silty clay loam. The lower part is mottled, light brownish gray and grayish brown, stratified silty clay loam. The substratum to about 63 inches is mottled, light brownish gray heavy silt loam.

Included with this soil in mapping are a few areas of short, steep slopes and areas that remain wet for extended periods. Also included are areas of Okaw soils in similar positions as this Sexton soil. Okaw soils make up about 10 percent of this unit.

Water and air move through this soil at a slow rate, and surface runoff from cultivated areas is slow to ponded. Reaction ranges from medium acid to very strongly acid in the subsoil and varies widely in the surface layer as a result of local liming practices. The surface layer is friable but remains wet late in spring. It tends to crust or puddle after hard rains because of weak struc-

ture and low organic-matter content. The platy subsurface layer is compact and restricts water movement and root growth. The seasonal water level is near or at the surface during the spring. Available water capacity is high.

Most areas of this soil are farmed. This soil has good potential for growing cultivated crops, hay, pasture, and trees. The potential for recreation uses is poor, for wildlife uses it is fair to good, and for most engineering uses it is poor.

This soil is suited to corn, soybeans, grain sorghum, wheat, and grasses and legumes for hay and pasture. The wetness hazard and surface crusting are the main management problems. Surface drainage with shallow ditches helps in removing excess water. Minimum tillage and returning crop residue to the soil help to build structure and keep the surface more porous. Deep plowing and chisel plowing are somewhat helpful in disrupting the platy subsurface layer to increase water movement and root growth.

Wetness-tolerant grasses and legumes grow best on this soil. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth. Excess surface water should be removed by drains to improve the crop and to extend the period of use.

This soil is suited to trees that are adapted to wet conditions. Tree seeds and seedlings survive and grow well if competing vegetation is controlled by proper site preparation or by spraying, cutting, or girdling. Equipment used for planting and harvesting is limited by wetness during some periods.

Most structures are not well suited to this soil because of wetness. Wetness problems can be overcome with proper design and installation. Sewage lagoons should be installed rather than a septic tank filter field system. Streets and roads should be banked and ditched to remove excess water and improve the stability of the materials. Capability subclass IIIw; woodland suitability subclass 3w.

214B—Hosmer silt loam, 2 to 7 percent slopes. This gently sloping, moderately well drained soil is on convex ridgetops, knolls, and side slopes along drainageways. Individual areas of this soil are elongated or irregular in shape and range from 2 to about 1,000 acres in size.

Typically, the surface layer is brown silt loam about 9 inches thick. It ranges from 4 to 10 inches in thickness over most of the area. The subsoil is about 41 inches thick. The upper 14 inches is strong brown light silty clay loam and heavy silt loam and mottled yellowish brown heavy silt loam. In the lower 27 inches the subsoil is a firm, compact zone; a thin layer of mottled, yellowish brown heavy silt loam, which has thick, pale brown coatings, overlies mottled yellowish brown and dark yellowish brown, firm and brittle silty clay loam and mottled dark yellowish brown and pale brown, very firm silt loam. The substratum to a depth of about 67 inches is mottled yellowish brown and pale brown, firm silt loam. In some places the upper part of the subsoil is thicker and the very firm, compact lower part is deeper and thinner. In other places the surface layer is dark yellowish brown.

Included with this soil in mapping are a few areas of similar soils on short, steep slopes and escarpments, a few small wet areas, and a few severely eroded areas. Also included are small areas of Alford and Stoy soils. Alford soils are on high knolls on ridges, and Stoy soils are at the head of drainageways and in nearly level areas on broad ridgetops. Inclusions make up about 5 percent of this unit.

Water and air move through the upper part of the subsoil at a moderate rate and through the compact lower part at a very slow rate. Surface runoff from cultivated areas is medium. Reaction ranges from extremely acid to strongly acid in the subsoil and varies in the surface layer because of local liming practices. The surface layer is friable and easily tilled but tends to crust or puddle after hard rains. Root development is restricted below a depth of about 25 to 40 inches by the very firm, compact lower part of the subsoil. Organic-matter content is low, and available water capacity is moderate.

Most areas of this soil are farmed. This soil has fair to good potential for cultivated crops, hay, pasture, trees, and some special crops. The potential for most recreation uses is fair, for most wildlife uses it is good, and for most engineering uses it is fair to good.

This soil is well suited to corn, soybeans, grain sorghum, wheat, and grasses and legumes for hay and pasture. Controlling erosion, maintaining or improving tilth and fertility, and the moderate available water supply are the main problems. Minimum tillage, winter cover crops, and grassed waterways help prevent excessive soil loss from cultivated areas. A few areas have slopes that are suited to terraces and farming on the contour. Zero tillage will also protect the soil, increase water intake, and improve tilth. Returning crop residue to the soil or regularly adding other organic material helps to improve fertility, reduce crusting, and increase water intake.

The use of the soil for pasture or hay helps in controlling erosion. Only species that are not adversely affected by the "perched" water above the compact subsoil should be planted. Grasses and legumes grow well if properly fertilized. Competing vegetation can be controlled by clipping or spraying. Rotating the pasture prevents overgrazing.

Some special crops are well suited to this soil, in particular, apples, peaches, and strawberries. Establishing a cover crop and applying mulch in orchards and planting strawberries on the contour help in controlling erosion. A variety of vegetables are suited and grow well if erosion is controlled and fertilizers are added as necessary.

This soil is well suited to trees, and many areas are in native hardwoods. Tree seeds and seedlings survive and grow well if competing vegetation is controlled or removed by site preparation or by spraying, cutting, or girdling. There is some hazard of windthrow, but the damage is small if adapted species are planted.

This soil is suited to building site development if the limitation imposed by the perched water table in the subsoil is overcome. Sewage lagoons function well, whereas septic tank absorption fields do not function well because of permeability. Proper design and installation of footings and footing tile will eliminate wetness and frost-action hazards. Capability subclass IIe; woodland suitability subclass 2o.

214C2—Hosmer silt loam, 7 to 12 percent slopes, eroded. This sloping, moderately well drained soil is on narrow ridgetops, knolls, and side slopes. Individual areas of this soil are irregular or elongated and range from 2 to about 50 acres in size.

Typically, the surface layer is dark yellowish brown silt loam about 6 inches thick. It ranges from 4 to 8 inches in thickness over most of the area. The subsoil is about 41 inches thick. The upper 14 inches is strong brown light silty clay loam over mottled yellowish brown heavy silt loam. In the lower 27 inches the subsoil has a very firm and compact zone; a thin layer of mottled yellowish brown heavy silt loam, which has thick pale brown coatings, overlies mottled dark yellowish brown, very firm and compact silty clay loam and mottled dark yellowish brown, very firm and compact silt loam. The substratum to a depth of about 64 inches is mottled yellowish brown, firm silt loam. In some places the upper part of the subsoil is thicker, and the very firm, compact lower part of the subsoil is deeper and thinner. In wooded areas the surface layer is dark grayish brown and is underlain by a yellowish brown silt loam subsurface layer.

Included with this soil in mapping are a few small areas that are severely eroded. These areas are at the end of ridges and on side slopes. Also included are small areas of Stoy and Alford soils. Stoy soils are at the head of drainageways, and Alford soils are on higher knolls or ridgetops. Inclusions make up about 5 percent of this unit.

Water and air move through the upper part of the subsoil at a moderate rate and through the very firm and compact lower part at a very slow rate. Surface runoff in cultivated areas is medium to rapid. Reaction ranges from extremely acid to strongly acid in the subsoil and varies in the surface layer because of local liming practices. The surface layer is friable and easily tilled but tends to crust or puddle after hard rains, especially in areas where the plow layer contains subsoil material. Root development is restricted below a depth of 20 to 36 inches by the very firm, compact zone. Organic-matter content is low, and available water capacity is moderate.

Most areas of this soil are farmed. This soil has fair potential for cultivated crops, and fair to good potential for hay, pasture, trees, and some special crops. It has fair potential for most recreation uses and good potential for openland and woodland wildlife. It has fair potential for most engineering uses.

This soil is suited to corn, soybeans, grain sorghum, wheat, and grasses and legumes for hay and pasture. If the soil is used for cultivated crops, there is a hazard of erosion. Minimum tillage, winter cover crops, and grassed waterways help prevent excessive soil loss. A few areas have slopes that are long enough and smooth enough to be terraced and farmed on the contour. Soil crusting can be reduced by zero tillage or by returning crop residue to the surface. Crops that are drought tolerant should be planted to reduce the effects of restricted rooting depth and moderate available water supply.

Grasses and legumes help in controlling erosion and grow well if the soil is properly fertilized. Competing vegetation should be controlled by clipping or spraying as needed. Proper stocking rates, pasture rotation, and restricted use during wet periods help to keep the pasture and the soil in good condition.

This soil is suited to apples and peaches if the slopes are protected from erosion and fertilizers are added as needed. Erosion can be controlled by properly established and maintained cover crops.

This soil is well suited to trees, and many areas are in native hardwoods. Tree seeds and seedlings survive and grow well if competing vegetation is controlled or removed by site preparation or by spraying, cutting, or girdling. Windthrow is a problem because of the restricted rooting depth and the perched water. Pine trees grow well and are adapted to this soil because of their tap root system.

This soil is suitable for building site development if proper design and installation are used. Streets and roads are subject to frost action, which can be controlled by proper banking and ditching to remove excess water. Capability subclass IIIe; woodland suitability subclass 2o.

214C3—Hosmer silty clay loam, 7 to 12 percent slopes, severely eroded. This sloping, moderately well drained soil is on narrow, convex ridges and on side slopes below ridges and along drainageways. Individual areas of this soil are irregular in shape and range from 2 to about 100 acres in size.

Typically, the surface layer is yellowish brown light silty clay loam about 4 inches thick. It ranges from 2 to about 6 inches in thickness over most of the area. The subsoil is about 37 inches thick. The upper 10 inches is strong brown light silty clay loam over mottled yellowish brown heavy silt loam. In the lower 27 inches the subsoil has a very firm and compact zone; a thin layer of mottled yellowish brown heavy silt loam, which has thick, pale brown coatings, overlies mottled dark yellowish brown, very firm and compact silty clay loam and mottled dark yellowish brown, very firm and compact silt loam. The substratum to a depth of about 60 inches is mottled dark yellowish brown silt loam. In some places the surface layer is silt loam. In other places the upper part of the subsoil is thicker, and the lower part is thinner and deeper. In a few places bedrock is within 50 inches of the surface.

Included with this soil in mapping are a few areas of similar soils on short, steep slopes and escarpments, a few areas of bedrock outcrops, and a few wet areas at the head of drainageways. Also included are a few areas of Alford, Hickory, and Belknap soils. Alford soils are on

ridgetops, Hickory soils are on lower side slopes, and Belknap soils are in narrow drainageways. A few gullied areas of this soil are also included. In these areas most or all of the subsoil has been eroded away. Inclusions make up about 10 percent of this unit.

Water and air move through the upper part of the subsoil at a moderate rate and through the lower part at a very slow rate. Surface runoff from cultivated areas is rapid to very rapid. Reaction ranges from extremely acid to strongly acid in the subsoil and varies in the surface layer because of local liming practices. Root development is restricted below a depth of 14 to 30 inches by the very firm, compact lower part of the subsoil. The surface layer is firm and somewhat difficult to till. Clods form if the surface layer is worked when wet, and crusts form after hard rains because of poor structure, the clay content, and very low organic-matter content. Available water capacity is moderate.

Most areas of this soil are farmed. This soil has poor to fair potential for cultivated crops and fair potential for hay, pasture, and trees. The potential for most recreation uses is fair to poor, and for most wildlife uses it is fair to good. For most engineering uses it is fair.

This soil is suited to corn, soybeans, grain sorghum, wheat, and legumes and grasses for hay and pasture. Cultivated crops should be grown in rotation with grasses and legumes to protect the soil from erosion. Erosion is the main hazard, but low fertility and poor tilth are other problems. Excess soil losses can be prevented by crop rotations, minimum tillage, cover crops, and grassed waterways. Tilth of the clayey surface layer can be improved by adding crop residue, reducing trips over the field, and allowing the surface to dry before working it.

Pasture and hay help in controlling erosion. Grasses and legumes grow well if properly fertilized and maintained. Establishment is a problem because of poor tilth, and stands are often spotty. Careful seedbed preparation or seeding a nurse crop will help insure adequate germination and good stands. Proper stocking rates, pasture rotation, and restricted use during wet periods help to keep pastures in good condition.

Some areas of idle land have revegetated naturally and are adequately protected from erosion. Many of these areas are supplying food and cover for a variety of openland wildlife. If these areas were properly fertilized and cultivated with additional plants, they could be greatly improved for wildlife use.

This soil is suited to trees if adapted species are planted. Pine are generally better suited than hardwoods. There is a windthrow hazard because of the restricted rooting depth. Mechanical planters are somewhat limited because the silty clay loam in the surface layer is difficult to pack around roots of seedlings.

This soil is suited to building site development if the problems of slope and erosion are overcome. Some reshaping of the slopes is necessary if this soil is used for building sites. Erosion can be controlled with proper shaping, fertilizing, and seeding of the slopes. Onsite waste disposal systems are not suited because of slope and slow permeability. Sewage lagoons are difficult to construct because of slope. Capability subclass IVe; woodland suitability subclass 2o.

214D2—Hosmer silt loam, 12 to 18 percent slopes, eroded. This strongly sloping, moderately well drained soil is on convex ridgetops, on side slopes below ridges, and on foot slopes below steep soils. Individual areas of this soil are elongated or irregular in shape and range from 2 to about 30 acres in size.

Typically, the surface layer is dark yellowish brown silt loam about 5 inches thick. It ranges from 4 to 7 inches in thickness over most of the area. The subsoil is about 40 inches thick. The upper 13 inches is strong brown light silty clay loam over mottled yellowish brown heavy silt loam. In the lower 27 inches the subsoil has a very firm and compact zone; a thin layer of mottled yellowish brown heavy silt loam, which has thick, pale brown coatings, overlies mottled dark yellowish brown, very firm and compact silty clay loam and mottled dark yellowish brown, firm silt loam. The substratum to a depth of about 64 inches is mottled yellowish brown silt loam. In some places the upper part of the subsoil is thicker, and the very firm, compact lower part is deeper and thinner. In many wooded areas the surface layer is dark grayish brown and is underlain by a yellowish brown subsurface layer. In a few places bedrock is within about 50 inches of the surface.

Included with this soil in mapping are a few areas of bedrock escarpments and a few severely eroded areas on side slopes. Also included are a few areas of similar soils on lesser sloping ridgetops and a few areas of Alford, Hickory, and alluvial soils. The Alford soils are on ridgetops and some side slopes, and Hickory soils are on the lower part of some slopes. The alluvial soils are on the bottom of narrow drainageways. Inclusions make up 5 to 10 percent of this unit.

Water and air move through the upper part of the subsoil at a moderate rate and through the lower part at a very slow rate. Surface runoff is rapid. Reaction ranges from extremely acid to strongly acid in the subsoil and varies in the surface layer because of local liming practices. The surface layer is friable and easily tilled but tends to crust or puddle after hard rains, especially in areas where the plow layer contains subsoil material. Organic-matter content is low, and available water capacity is moderate.

Most areas of this soil are used for pasture or are in native hardwoods. This soil has fair to poor potential for cultivated crops and fair to good potential for hay, pasture, and trees. The potential for most recreation uses is fair to poor, for wildlife use it is good to fair, and for most engineering uses it is fair to poor.

This soil is suited to corn, soybeans, grain sorghum, wheat, and hay and pasture in a rotation system. The erosion hazard and slopes are the main problems affecting use and management. Minimum tillage, winter cover crops, and grassed waterways help to prevent excess soil

loss. A few slopes are uniform enough to be terraced or contour farmed. Zero tillage permits row crops to be grown more often in the rotation, protects the soil from erosion, and increases water intake.

Most areas of this soil are now in pasture and are adequately protecting the soil from erosion. Old pastures can be safely renovated by use of chemicals. This method eliminates the necessity of conventional tillage, which often results in erosion on this sloping soil. Legumes and grasses grow well if properly fertilized and maintained by spraying or clipping to remove competitive plants.

This soil is well suited to trees, and many areas are in native hardwoods. Tree seeds and seedlings survive and grow well if competitive vegetation is controlled or removed by site preparation or by spraying, cutting, or girdling. Windthrow is somewhat of a problem because of the restricted rooting depth and the perched water. The hazard can be reduced by planting species that are adapted and that have a tap root system.

This soil is not well suited to building site development or onsite waste disposal because of slopes. Some reshaping of slopes is necessary to overcome this problem. The areas along drainageways are generally suitable sites for pond reservoirs. Capability subclass IVe; woodland suitability subclass 2r.

214D3—Hosmer silty clay loam, 12 to 18 percent slopes, severely eroded. This strongly sloping, moderately well drained soil is on side slopes along drainageways and on hillsides below ridges and above steep slopes. Individual areas of this soil are mostly irregular in shape and range from 2 to about 200 acres in size.

Typically, the surface layer is dark yellowish brown silty clay loam about 2 inches thick. It ranges from 0 to about 3 inches in thickness over most of the area. The subsoil is about 35 inches thick. The upper 8 inches is strong brown light silty clay loam over mottled yellowish brown heavy silt loam. In the lower 27 inches the subsoil has a very firm and compact zone; a thin layer of mottled yellowish brown heavy silt loam, which has thick, pale brown coatings, overlies mottled dark yellowish brown, very firm and compact silty clay loam and mottled dark yellowish brown, very firm and compact silt loam. The substratum to a depth of about 60 inches is mottled strong brown silt loam. In some places the surface layer is silt loam. In other places the upper part of the subsoil is thicker, and the lower part is thinner and deeper.

Included with this soil in mapping are a few small sandy areas, a few areas where bedrock crops out, and a few bedrock escarpments. Also included are a few areas of Alford, Hickory, and alluvial soils. Alford soils are on narrow ridgetops and on side slopes in some areas. The Hickory soils are on the lower part of some slopes, and the alluvial soils are at the bottom of narrow drainageways. In a few areas the lower part of the subsoil contains sandstone fragments, and bedrock is within 50 inches of the surface. In some severely gullied areas, most or all of the subsoil has been eroded away. Inclusions make up from 10 to 15 percent of this unit.

Water and air move through the upper part of the subsoil at a moderate rate and through the lower part at a very slow rate. Surface runoff is very rapid. Reaction ranges from extremely acid to strongly acid in the subsoil and varies at the surface as a result of local liming practices. The surface layer is firm and somewhat difficult to till. Clods form if the surface layer is worked when wet, and the surface layer tends to crust after hard rains because of poor structure, very low organic-matter content, and increased clay content. Root development is restricted by the very firm, compact lower part of the subsoil. Available water capacity is moderate.

Most areas of this soil are in pasture or are idle land. This soil has poor potential for cultivated crops and fair potential for hay, pasture, and trees. The potential for recreation is poor to fair, for most wildlife uses it is fair, and for most engineering uses it is poor.

This soil is not suited to row crops. If the soil is used for cultivated crops, there is a hazard of erosion, seedbeds are difficult to prepare, and fertility is low. Erosion can be reduced by minimum tillage or farming on the contour. Crop residue should be returned to the surface to improve tilth and reduce runoff.

Pasture and hay are the best suited uses of this severely eroded soil. When established and properly maintained, grasses and legumes help in controlling erosion. Seedbeds are difficult to prepare. Stands are often spotty because of poor germination, and fertilizers are needed for good growth. Clipping and spraying are necessary to keep out competing plants, and pastures should not be overgrazed or erosion will begin and gullies will form.

Many idle areas have naturally revegetated and provide food and cover for a variety of openland wildlife. These areas, if properly fertilized and planted, could be greatly improved for wildlife use.

This soil is suited to trees if adapted species are planted. Pine are generally best suited to this soil and will grow well. There is a windthrow hazard because of the restricted rooting zone. Mechanical planters are somewhat limited because of steepness of slopes and the silty clay loam surface.

This soil is not well suited to building sites because of steepness of slopes and the erosion hazard. Proper design and careful installation are needed to overcome these problems. Slopes can be shaped and erosion controlled by adding fertilizers and seeding a cover crop. Capability subclass VIe; woodland suitability subclass 2r.

243B—St. Charles silt loam, 2 to 7 percent slopes. This gently sloping, moderately well drained or well drained soil is on ridgetops and low knolls extending back from terrace breaks and on side slopes near the head of drainageways. Individual areas of this soil are mostly irregular in shape and range from 2 to about 50 acres in size.

Typically, the surface layer is dark brown silt loam about 7 inches thick. It ranges from 5 to 9 inches in thickness over most of the area. The subsurface layer is about 3 inches thick and is dark yellowish brown silt

loam. The subsoil is 45 inches thick. The upper 3 inches is dark yellowish brown heavy silt loam. The next 22 inches is dark yellowish brown silty clay loam. The lower part of the subsoil is mottled light brownish gray silty clay loam. The substratum to a depth of 67 inches is mottled grayish brown silty clay loam. In some places the lower part of the subsoil and the substratum consist of layers of silty clay, silty clay loam, silt loam, and loam. Also, in areas where the upper part of the subsoil has been mixed with the surface soil by plowing, there is no subsurface layer and the surface layer is dark yellowish brown silt loam.

Included with this soil in mapping are small areas having a sandy loam surface layer, sloping areas that are severely eroded, and areas having short, steep slopes. Also included are small areas of the somewhat poorly drained Hurst soils in low positions and at the head of drainageways and some areas of the more clayey Colp soils on side slopes.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is medium. Reaction ranges from very strongly acid to medium acid in the subsoil and varies widely in the surface layer as a result of local liming practices. The surface layer is friable and easily tilled. It has a tendency to crust or puddle after hard rains because of poor structure and low organic-matter content. Available water capacity is high.

Most areas of this soil are farmed. This soil has good potential for cultivated crops, hay, pasture, trees, and some special crops. It has fair to good potential for recreational uses, good potential for most wildlife uses, and fair to good potential for most engineering uses.

This soil is well suited to corn, soybeans, wheat, and grasses and legumes for hay and pasture. There is a moderate erosion hazard that must be controlled. Minimum tillage, winter cover crops, and grassed waterways help prevent excessive soil loss. Surface crusting can be reduced by the regular addition of crop residue or other organic material. Rotating crops and adding needed fertilizers will increase yields and improve the soil.

Fruits and vegetables will grow well on this soil if the soil is properly fertilized. The soil must be protected from erosion to maintain yields. Minimum tillage, winter cover crops, and contouring help prevent excessive soil loss. Returning crop residue or regularly adding other organic material helps to reduce crusting and increase water intake.

The use of the soil for pasture or hay helps in controlling erosion. Grasses and legumes grow well if the soil is properly fertilized. Plants that are not easily damaged by frost heave should be used.

This soil is suited to trees, and a few areas remain in native hardwoods. There are no hazards or limitations to be concerned about once the stand is established. Competing vegetation can be controlled by proper site preparation, spraying, or cutting during stand establishment.

This soil is suitable for building site development and for onsite waste disposal. High potential frost action and the moderately slow permeability are problems to overcome. Installing footings below the freeze zone can help prevent frost heaving. If an area is used as a septic tank absorption field the moderately slow permeability can be overcome by increasing the size of the absorption field. Capability subclass IIe; woodland suitability subclass 1o.

308B2—Alford silt loam, 2 to 6 percent slopes, eroded. This gently sloping, well drained soil is on narrow to broad, convex ridgetops, knolls, and side slopes at the head of drainageways. Individual areas of this unit are mostly irregular in shape and range from about 5 to 300 acres in size.

Typically, the surface layer is yellowish brown silt loam containing some strong brown subsoil material. It is about 8 inches thick but ranges from 5 to 9 inches in thickness over most of the area. The subsoil is 58 inches thick. The upper 34 inches is strong brown silty clay loam. The next 10 inches is brown silty clay loam. The lower 14 inches of the subsoil is brown heavy silt loam. In some places the surface layer is underlain by a thin layer of brown silt loam. Also, in some places, grayish mottles are in the middle and lower parts of the subsoil.

Included in mapping are small sandy areas, small wet areas on concave positions at the head of drainageways, and a few limestone sinkhole areas. Also included are small severely eroded areas on side slopes and at the end of narrow ridges; a few areas of short, steep slopes; some small areas of sloping Alford soils on side slopes; and some areas of the less permeable Hosmer soils on slightly lower positions on the ridgetops or at the head of drainageways. Inclusions make up about 5 percent of the unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is medium. Reaction ranges from medium acid to very strongly acid in the subsoil and varies widely in the surface layer as a result of local liming practices. The surface layer is friable and easily tilled. Areas that contain appreciable amounts of subsoil material tend to puddle or crust after hard rains. Organic-matter content is low, and available water capacity is high.

Most areas of this soil are farmed. This soil has good potential for cultivated crops, hay, pasture, trees, and various fruits and vegetables, good potential for most recreational and wildlife uses, and good potential for most engineering uses.

This soil is well suited to corn, soybeans, and small grain. Controlling erosion is the main problem of management. Minimum tillage, winter cover crops, and grassed waterways help prevent excessive soil loss. A few areas have slopes that are long enough and smooth enough to be terraced and farmed on the contour. Returning crop residue to the surface or regularly adding other organic material reduces crusting and increases water intake. This soil responds well to additions of lime and fertilizer.

Grasses and legumes for hay and pasture are well suited and help in controlling erosion. This soil is well suited to alfalfa.

This soil is well suited to fruits and vegetables. Erosion is the main management problem. Erosion can be controlled by cover crops, terracing, contouring, and minimum tillage. This soil can be irrigated if water is available and slopes are protected.

Trees grow well on this soil, and some areas remain in native hardwoods. Tree seeds and seedlings survive and grow well if competing vegetation is controlled or removed by proper site preparation, spraying, cutting, or girdling. There are no hazards or limitations in planting or harvesting trees.

This soil is well suited to building site development and onsite waste disposal. Exposed areas are subject to erosion, but vegetation provides adequate protection. Local roads and streets require banking and grading to reduce frost action damage. Capability subclass IIe; woodland suitability subclass 1o.

308C2—Alford silt loam, 6 to 12 percent slopes, eroded. This sloping, well drained soil is on convex ridgetops, knolls, and side slopes along drainageways. Individual areas of this soil are irregular or elongated in shape and range from 4 to 200 acres in size.

Typically, the surface layer is yellowish brown silt loam containing some strong brown subsoil material. It is about 7 inches thick but ranges from 5 to 9 inches in thickness over most of the area. The subsoil is 58 inches thick. The upper 34 inches is strong brown silty clay loam. The next 10 inches is brown silty clay loam. The lower 14 inches of the subsoil is brown heavy silt loam. In some places, particularly in timbered areas, the surface layer is dark grayish brown or very dark grayish brown and is underlain by a brown silt loam subsurface layer. In other places the lower part of the subsoil has grayish mottles mixed with the brown.

Included with this soil in mapping are a few limestone sinkholes, areas of bedrock outcrops, and small areas that are severely eroded. Also included are areas of similar soils, except that they have short steep slopes, and areas of bedrock escarpments. Some ridgetops on Fountain Bluff consist of soils that have a thin silty subsoil and a silty substratum that contains free lime within a depth of 40 inches. A few areas of the less permeable Hosmer soils are included at the head of drainageways and in low positions on the ridgetops. Inclusions make up 5 to 10 percent of the unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is medium to rapid. Reaction ranges from medium acid to very strongly acid in the subsoil and varies in the surface layer as a result of liming practices. The surface layer is friable and easily tilled. Areas that contain appreciable amounts of subsoil material tend to crust over or puddle after hard rains. Organic-matter content is low, and available water capacity is high.

Many areas of this soil are farmed, and some remain in native hardwoods. This soil has good potential for cultivated crops, hay, pasture, trees, and various fruits and vegetables, fair to good potential for many recreational and wildlife uses, and fair to good potential for most engineering uses.

This soil is suited to corn, soybeans, small grain, and grasses and legumes for hay and pasture. If the soil is used for cultivated crops, there is a hazard of erosion. Minimum tillage, crop rotation, winter cover crops, and grassed waterways help prevent excessive soil loss. A few areas on ridgetops that are wide enough or side slopes that are long enough and smooth enough can be terraced and farmed on the contour. Returning crop residue to the soil and adding fertilizers help maintain and improve this soil.

Many of the uneven or shorter slopes are suited to pasture and hay. Permanent cover of grasses and legumes is very effective in controlling erosion. Alfalfa is especially well suited to this soil.

This soil is suited to fruits and some vegetables, and many areas in the southern part of the county are in peach and apple orchards. Erosion is the main management problem. This is controlled in orchards by maintaining a cover crop. Areas planted to strawberries and vegetables can be protected by minimum tillage, by terracing, and by contouring. Applying a surface mulch helps in reducing erosion and increasing water intake. This soil can be irrigated if water is available and slopes are protected.

Some areas of this soil remain in native hardwoods, and growth of trees is good. Tree seeds and seedlings survive and grow well if competing vegetation is controlled or removed by site preparation, by spraying, or by cutting or girdling. There are no hazards or limitations to be concerned about in planting or harvesting trees.

This soil is suited to building site development and onsite waste disposal if proper design and installation are used. Slope limits use, and cutting and filling commonly are needed. Developments laid out on the contour of the natural landscape are more appealing and cope with the problems presented by slopes. Local streets and roads require proper ditching and banking to control erosion and limit frost action. Capability subclass IIIe; woodland suitability subclass 1o.

308C3—Alford silty clay loam, 6 to 12 percent slopes, severely eroded. This sloping, well drained soil is mostly on side slopes along drainageways or on hillsides between ridgetops and steep slopes. Individual areas of this soil are elongated or irregular in shape and range from 2 to about 40 acres in size.

Typically, the surface layer is mixed yellowish brown and strong brown light silty clay loam about 5 inches thick. The subsoil is about 55 inches thick. The upper 30 inches is strong brown silty clay loam. The next 10 inches is brown silty clay loam. The lower 15 inches of the subsoil is brown heavy silt loam. In some places the surface layer is silt loam and contains less subsoil material. In other places the lower part of the subsoil has grayish mottles.

Included with this soil in mapping are a few small areas of a soil that has a sandy surface layer and a few areas

along drainageways where bedrock crops out. Also included are areas of steeper Alford soil and a few areas where the soil has short, steep slopes. Inclusions make up about 5 percent of this unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is rapid. Reaction ranges from medium acid to very strongly acid in the surface layer as a result of local liming practices. The surface layer is firm, slow to dry, and somewhat difficult to till. Clods form if the surface layer is tilled when wet, and the surface tends to crust after hard rains because of poor structure and very low organic-matter content. Available water capacity is high.

Most areas of this soil are farmed. This soil has fair potential for growing cultivated crops, fair to good potential for hay, pasture, trees, and orchard crops, fair potential for most recreational and wildlife uses, and fair to good potential for most engineering uses.

This soil is suited to corn, soybeans, small grains, and grasses and legumes for hay and pasture. If the soil is used for cultivated crops, there is a hazard of erosion. Cultivated crops should be grown in rotation with grasses and legumes. Minimum tillage, zero tillage, winter cover crops, and grassed waterways help prevent excessive soil loss in cultivated areas. A few areas have slopes uniform enough to be farmed on the contour or stripcropped. Loss of the original surface layer has seriously reduced tilth and fertility. Returning crop residue to the soil or regularly adding other organic material will improve fertility, reduce crusting, and increase water intake.

The use of this soil for pasture or hay helps in controlling erosion. Grasses and legumes are well suited and grow well if fertilizers are added. Seedbeds are difficult to prepare, and stands are often spotty because of poor seed cover and surface crusting. A nurse crop of wheat is needed. Hay and pasture should be fully established before cutting or grazing.

If protected from erosion this soil is suited to peach and apple trees. Trees should be planted on the contour where practical, and a protective cover crop should be interplanted.

This soil is well suited to trees, and seedlings survive and grow well if competing vegetation is controlled by site preparation or by spraying. Erosion is a hazard when planting, but it can be reduced by planting on the contour or by planting a cover crop.

This soil is suited to building sites, but slopes limit use and many need to be reshaped. The soil is workable, but it is sticky when wet and has a severe erosion hazard. A cover crop should be planted to control erosion. Streets and roads are susceptible to frost action but can be protected by proper grading and banking to eliminate excess water and reduce the hazard. Capability subclass IVe; woodland suitability subclass 1o.

308D2—Alford silt loam, 12 to 18 percent slopes, eroded. This strongly sloping, well drained soil is on narrow, convex ridgetops, on hillsides below ridgetops, and on side slopes along drainageways. Individual areas of this soil are mainly elongated or irregular in shape and range from about 5 to 80 acres in size.

Typically, the surface layer is yellowish brown silt loam containing some strong brown subsoil material. It is about 5 inches thick but ranges from 4 to 7 inches in thickness over most of the area. The subsoil is about 55 inches thick. The upper 34 inches is strong brown silty clay loam. The next 10 inches is brown silty clay loam. The lower 11 inches is brown heavy silt loam. In some places, particularly in timbered areas, the surface layer is dark grayish brown and is underlain by brown silt loam. In other places the lower part of the subsoil has grayish mottles.

Included with this soil in mapping are small limestone sinkholes, areas of this Alford soil on short, steep slopes, and bedrock escarpments. Also included are many small areas of severely eroded soil; a few areas of bedrock outcrops along and at the head of drainageways; some areas of the stony Wellston soils at the head of drainageways, along drainageways, and at the base of some slopes; and, at the base of some slopes, areas of the loamy Hickory soils. Inclusions make up about 10 percent of this unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is rapid. Reaction ranges from medium acid to very strongly acid in the subsoil and varies in the surface layer as a result of liming practices. The surface layer is friable and easily tilled. Areas that contain appreciable amounts of subsoil material tend to crust over or puddle after hard rains.

Many areas of this soil are farmed, and some remain in native hardwoods. The soil has fair potential for cultivated crops, fair to good potential for hay, pasture, trees, and fruit, fair potential for most recreational uses, fair to good potential for most wildlife uses, and fair to poor potential for most engineering uses.

This soil is suited to corn, soybeans, small grain, and grasses and legumes in a rotation system. If this soil is used for cultivated crops, there is a hazard of erosion. Minimum tillage, winter cover crops, and grassed waterways help prevent excessive soil loss. A few areas have slopes that can be terraced and farmed on the contour. These areas can be farmed more intensively after terracing. Returning crop residue to the soil or regularly adding other organic material helps to improve fertility and increase water intake.

The use of this soil for pasture or hay helps in controlling erosion. A wide range of grasses and legumes are suited and grow well on this soil if fertilized. The pasture should be maintained by proper stocking, pasture rotation, and restricted use during wet periods. It should be clipped or sprayed as needed to keep out competing plants.

This soil is suited to peach and apple trees if a permanent sod cover is maintained to control the erosion hazard.

Some areas of this soil remain in native hardwoods, and growth of trees is good. There are no hazards or limitations to planting or harvesting trees. If a mechanical planter is used, it is best to plant on the contour where

possible. Plant competition should be controlled by site preparation, spraying, cutting, or girdling.

This soil is limited for building site development and onsite waste disposal by slope and the erosion hazard. Streets and roads should be constructed on the contour as much as possible to reduce roadside erosion. Capability subclass IVe; woodland suitability subclass 1o.

308D3—Alford silty clay loam, 12 to 18 percent slopes, severely eroded. This strongly sloping, well drained soil is mainly on hillsides between ridgetops and steep slopes and on side slopes along drainageways. Individual areas of this soil are elongated or irregular in shape and range from about 5 to 50 acres in size.

Typically, the surface layer is strong brown silty clay loam about 4 inches thick. The subsoil is about 50 inches thick. The upper 25 inches is strong brown silty clay loam. The next 10 inches is brown silty clay loam. The lower 15 inches is brown heavy silt loam. The substratum to a depth of about 60 inches is brown silt loam. In a few places the original surface layer remains, and it is dark brown or yellowish brown silt loam. In other places the lower part of the subsoil has grayish mottles.

Included with this soil in mapping are a few sinkholes, a few areas along drainageways and on hillsides where bedrock crops out, and a few areas of bedrock escarpments at the head of drainageways. Also included are some areas of the stony Wellston soils and the loamy Hickory soils at the base of some slopes and along drainageways, a few areas of the slowly permeable Hosmer soils along drainageways, and some areas that are so severely eroded and gullied that the lower part of the subsoil is at the surface. Inclusions make up 10 to 15 percent of this unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is rapid to very rapid. Reaction ranges from medium acid to very strongly acid in the subsoil and varies in the surface layer as a result of local liming practices. The surface layer is firm, slow to dry, and somewhat difficult to till. Clods can form if this soil is tilled when wet, and the surface tends to crust over after hard rains because of poor structure, increased clay content, and very low organic-matter content. Available water capacity is high.

Most areas of this soil are farmed. This soil has poor potential for cultivated crops and fair to good potential for hay, pasture, and trees. The potential for recreational and wildlife uses is poor to fair, and for most engineering uses it is poor to fair.

This soil is well suited to grasses and legumes for hay and pasture. This soil is erodible and low in fertility, and crusts form at the surface. It should be fertilized, and crop residue should be returned to the soil to improve fertility, reduce crusting, and increase water intake. Legumes and grasses help in controlling erosion. The soil and pasture can be maintained by rotating pastures and restricting use during wet periods.

Row crops are poorly suited to this soil because of slopes and the erosion hazard. Extreme caution and minimum tillage or zero tillage are needed when this soil is used for cultivated crops.

This soil is suited to trees, and some idle areas are naturally revegetating with native hardwoods. Controlling plant competition is the main concern of management. Competing vegetation can be controlled or removed by proper site preparation, by spraying, or by cutting.

Most idle land areas of this soil have sufficient cover to protect the surface from excess erosion. These areas are well suited to a wide variety of openland wildlife and plants.

This soil is generally unsuited to building site development or onsite waste disposal because of steepness of slopes. Certain types of structures can be developed on the natural landscape. Other areas require grading and leveling to reshape the landscape to make it suitable for these uses. Streets and roads should be constructed on the contour where possible to limit erosion of roadsides. Capability subclass VIe; woodland suitability subclass 1o.

308E—Alford silt loam, 18 to 30 percent slopes. This moderately steep to steep, well drained soil is on hillsides along drainageways and bottom lands. Individual areas are irregular in shape and range from 5 to about 400 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 3 inches thick. The subsurface layer is yellowish brown silt loam about 7 inches thick. The subsoil is about 50 inches thick. The upper 25 inches is strong brown silty clay loam. The next 15 inches is brown light silty clay loam. The lower 10 inches is brown heavy silt loam. In some places the subsoil contains less clay and is heavy silt loam in the upper part. In other places the surface layer is loam, and the subsoil is clay loam.

Included with this soil in mapping are small areas that are severely eroded, small sandy areas, areas of limestone sinkholes, and areas of bedrock outcrops. Also included are areas where slopes are short and steep, areas of bedrock escarpments, and small areas of the stony Wellston soils along the drainageways or at the base of some slopes. In some areas the Wellston soils are at the head of drainageways. In other places large boulders and stones are on the surface. These areas are normally just below bedrock escarpments. Inclusions make up 5 to 10 percent of this unit.

Water and air move through this soil at a moderate rate, and surface runoff is rapid to very rapid. Reaction ranges from medium acid to very strongly acid in the subsoil and from medium acid to neutral in the surface layer. Organic-matter content is low, and available water capacity is high.

Most areas of this soil are in native hardwood trees. This soil has fair to good potential for pasture and trees, mostly fair to good potential for wildlife uses, and poor potential for most engineering uses.

This soil is not suited to cultivated crops because of steep slopes. Cleared areas are best suited to pasture, although the less sloping areas of this unit can be used for hay. Grasses and legumes grow well and help in con-

trolling erosion once the stand becomes established. Steep slopes limit machinery use and make site preparation, cutting or clipping, and harvesting difficult when this soil is used for hay. Grazing should be closely watched, and pastures should be rotated to keep the pasture and soil in good condition.

This soil is best suited to trees, and most areas are used for timber. The erosion hazard and equipment limitations are moderate. Competing vegetation limits growth and can be controlled by spraying, cutting, or girdling. Once established, trees adequately protect this soil from excessive erosion. Caution must be used during logging operations because exposed areas erode rapidly. Rocks, stones, and bedrock escarpments interfere with ease of logging in some areas.

This soil is not well suited to building site development or onsite waste disposal because of steep slopes. Roads are difficult to maintain because of the erosion hazard along roadbanks and ditches and should be constructed on the contour if possible. Capability subclass VIe; woodland suitability subclass 1r.

308E3—Alford silty clay loam, 18 to 30 percent slopes, severely eroded. This moderately steep to steep, well drained soil is mainly along drainageways and on hillsides above bottom land soils. Individual areas of this soil are irregular in shape and range from about 4 to 40 acres in size.

Typically, the surface layer is dark brown silty clay loam about 2 inches thick. This layer has been darkened by additions of organic matter. It ranges from 0 to 3 inches in thickness. The subsoil is about 40 inches thick. The upper 15 inches is strong brown silty clay loam. The next 10 inches is brown silty clay loam. The lower 15 inches is brown heavy silt loam. The substratum to a depth of 60 inches is brown silt loam. In a few places the original surface layer remains. It is dark brown or yellowish brown silt loam. In other places the subsoil is thinner and is brown silt loam throughout.

Included with this soil in mapping are a few limestone sinkholes and areas where bedrock crops out along drainageways and on hillsides. Also included are bedrock escarpments; small areas of this Alford soil where slopes are short and steep; small areas of the loamy Hickory and the stony Wellston soils on the lower parts of side slopes and at the head of drainageways; some small areas of the nearly level, somewhat poorly drained Wakeland soils along the narrow drainageways; and some areas that are so severely gullied and eroded that the lower part of the subsoil is at the surface. Inclusions make up 10 to 15 percent of this unit.

Water and air move through this soil at a moderate rate, and surface runoff is very rapid. Reaction ranges from medium acid to very strongly acid in the subsoil and varies at the surface because of local liming practices. The surface layer is firm and slow to dry. Clods can form if this soil is tilled when wet. Organic-matter content is low, and available water capacity is high.

Most areas of this soil are in pasture or are idle land. This soil has poor potential for cultivated crops, poor to good potential for hay, pasture, and trees, poor potential for recreation uses, fair to good potential for most wildlife uses, and poor potential for most engineering uses.

This soil is not suited to cultivated crops because of the hazard of erosion and equipment limitations. Hay can be grown in the less sloping areas of this unit where equipment can be safely used.

Once established, pastures grow well on this soil if a proper maintenance program is followed. Such a program includes adding fertilizers, rotating pastures to prevent overgrazing, and restricting use during wet periods.

Most idle areas of this soil provide sufficient cover to adequately protect the surface from excess erosion. These areas are well suited to a wide variety of openland wildlife and openland plants.

This soil is well suited to trees, and a few of the idle areas are naturally revegetating with native hardwoods. Plant competition, erosion hazard, and equipment limitations are management problems that must be overcome if this soil is used as woodland. Proper site preparation and spraying or cutting will control plant competition. Planting should be on the contour where possible to control erosion. The steeper parts of slopes should be hand planted, and bedrock escarpments limit accessibility in some places.

This soil is generally unsuited to building sites or onsite waste disposal because of slopes. Building and maintaining roads and streets are difficult because of steep slopes and the erosion hazard. Building on the contour where possible reduces the rate of water runoff and limits erosion. Capability subclass VIe; woodland suitability subclass 1r.

308G—Alford silt loam, 30 to 50 percent slopes. This very steep, well drained soil is on dissected hillsides in areas near the river bluff. Individual areas of this soil are irregular in shape and range from about 10 to 700 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 2 inches thick. The subsurface layer is yellowish brown silt loam about 5 inches thick. The subsoil is about 45 inches thick. It is brown silt loam in the upper 3 inches. The next 20 inches is strong brown light silty clay loam. The lower part is yellowish brown silt loam. The substratum to a depth of 60 inches is yellowish brown silt loam. In some places the subsoil is thinner and contains less clay. Also, in places the substratum contains free lime.

Included with this soil in mapping are a few limestone sinkholes, areas that are severely eroded, areas that contain bedrock escarpments, and areas of bedrock outcrops. Also included are some less sloping areas of this Alford soil on narrow ridgetops and on the upper part of slopes and a few areas of Wellston soils at the head of drainageways and along drainageways. Inclusions make up about 10 percent of this unit.

Water and air move through this soil at a moderate rate, and surface runoff is very rapid. Reaction ranges from medium acid to very strongly acid in the subsoil and from medium acid to neutral in the surface layer. Organic-matter content is low, and available water capacity is high.

Most areas of this soil are in native hardwood trees. This soil has good potential for trees and for some wildlife uses. The potential for all other uses is poor.

This soil is not suited to cultivated crops or hay because of very steep slopes. In some places the less sloping areas can be planted to pasture. The erosion hazard is severe and difficult to control. Proper stocking rates and timely deferment of grazing are necessary to keep the pasture in good condition.

This soil is best suited to trees, and most areas are used for timber. The very steep slopes limit equipment use, and the erosion hazard is severe. Once established, trees adequately protect this soil from excessive erosion. Extreme care must be used during logging operations because logging trails and roads will rapidly erode. Removing and cutting trees are problems, but special equipment and safety precautions can overcome these problems.

The very steep slopes make this soil unsuitable for building development. A few less sloping areas, however, that were included in mapping may be suitable. Roads are difficult to build and maintain because of the severe erosion hazard and should be constructed on the contour where possible to limit erosion. Capability subclass VIIe; woodland suitability subclass 1r.

331—Haymond silt loam. This nearly level, well drained soil is along streams on natural levees. The areas are elongated and range from 4 to about 60 acres in size.

Typically, the surface layer is brown silt loam about 8 inches thick. It ranges from 7 to about 10 inches in thickness over most of the area. The substratum to a depth of 60 inches is brown and dark yellowish brown silt loam. In some places the substratum is strongly acid. Also, in a few areas the lower part of the substratum contains stony materials. In a few places buried clayey material is within 50 inches of the surface.

Included with this soil in mapping are small areas of a somewhat poorly drained Wakeland soil in similar or slightly lower positions. Also included are Burnside soils in areas that are shallow to bedrock. Inclusions make up about 5 percent of this unit.

Water and air move through this soil at a moderate rate, and surface runoff is slow. This soil is flooded occasionally to frequently for very brief periods, mainly in winter. Reaction ranges from neutral to medium acid. The surface layer is very friable and easily tilled. Organic-matter content is low to medium, and available water capacity is very high.

Many areas of this soil are farmed, but some areas remain in trees or have been planted to pasture. This soil has good potential for cultivated crops, hay, pasture, and trees, good to poor potential for wildlife and recreation uses, and poor potential for most engineering uses.

This soil is suited to corn, soybeans, small grains, grasses and legumes for hay and pasture, and some specialty crops. Flooding, with associated deposition and streambank erosion, is the main hazard. The flooding hazard is greatest in winter, but occasionally crops are damaged by floods during the growing season.

This soil is well suited to a wide variety of trees, and some areas remain in native hardwoods. Flooding can damage young seedlings. Plant competition should be controlled to obtain maximum growth rates.

This soil is generally unsuited to building site development because flooding is a hazard unless the soil is adequately protected by upstream structures. Capability class I; woodland suitability subclass 1o.

333—Wakeland silt loam. This nearly level, somewhat poorly drained soil is on narrow and broad, flat bottom lands along creeks and streams. Individual areas are mostly elongated and irregularly shaped in broad areas and range from about 5 to several hundred acres in size.

Typically, the surface layer is brown silt loam about 13 inches thick. The substratum to a depth of 60 inches is silt loam. The upper 4 inches is brown with brownish gray mottles. The next 22 inches is grayish brown with dark yellowish brown mottles. The lower 21 inches is light brownish gray with brown mottles. On some narrow bottom lands, the lower part of the substratum contains stony loam. On some broad bottoms, the lower part of the substratum contains silty clay loam or silty clay sediments. In some places reaction in the lower part of the substratum is mildly alkaline.

Included in mapping are small areas that have a sandy surface layer, small wet areas, areas where rock crops out, and small areas of short, steep slope breaks. Also included are areas of the better drained Haymond soils on slightly higher positions near streams and some areas of Dupo soils on the Mississippi River bottoms. Inclusions make up about 5 percent of this unit.

Water and air move through this soil at a moderate rate, and surface runoff is slow. Reaction ranges from medium acid to neutral. The surface layer is very friable and easily tilled throughout a wide range of moisture content. The seasonal high water table and flooding or overflow limit the choice of plants in some years. Organic-matter content is low, and available water capacity is very high.

Most broad areas of this soil are farmed, and many narrow areas remain in trees. This soil has good potential for cultivated crops, hay, pasture, and trees. The potential for most recreational uses is poor to fair, and it is fair to good for most wildlife uses. It is good for special crops and poor for most engineering uses.

This soil is well suited to corn, soybeans, grain sorghum, and grasses and legumes for hay and pasture. The flooding hazard is greatest in winter, but occasional damage to cultivated crops occurs during the growing season. Streambank erosion is another hazard, and it can be controlled by maintaining adequate vegetative cover on banks.

Many of the narrow areas are used for pasture or hay. Proper stocking rates, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and soil in good condition. Clipping and spraying can control weeds and brush.

This soil is well suited to trees, and many of the narrow areas remain in native hardwoods. Competing vegetation is a problem that can be controlled by proper site preparation, prescribed burning, spraying, cutting, or girdling. Flooding may damage young seedlings. Only trees that can tolerate seasonal wetness should be planted.

Special crops, such as strawberries, peppers, and tomatoes, grow well on this soil. In general, this soil is well suited to most vegetables and provides good sites for gardens. Flooding can cause damage in some years. Fertilizers should be added according to tests for the crop that is planted.

This soil is generally unsuited to building sites or waste disposal systems because of the flooding or overflow hazard. Levees and dikes can be built to protect areas from flooding, but in many places they are not practical. Capability subclass IIw; woodland suitability subclass 2w.

334—Birds silt loam. This nearly level, poorly drained soil is in slight depressions or low-lying areas on flood plains. Individual areas of this soil are elongated or rounded in shape and range from 5 to about 300 acres in size.

Typically, the surface layer is light gray and grayish brown silt loam about 7 inches thick. The substratum to a depth of about 60 inches is gray silt loam. In some places the lower part of the substratum contains stony loam or sandy loam layers. In a few places the substratum overlies a buried silty clay.

Included with this soil in mapping are a few areas where water ponds for extended periods. Also included are areas of Wakeland soils along streams and Bonnie soils in low-lying places similar to those of this Birds soil. Inclusions make up about 15 percent of this unit.

Water and air move through this soil at a moderately slow rate, and surface runoff is slow to ponded. Reaction ranges from medium acid to mildly alkaline in most areas, but some areas have layers that range to strongly acid. The surface layer is friable and easily tilled but remains wet late in the spring. This soil is flooded and has a high water level at or near the surface during the spring. Organic-matter content is low, and available water capacity is high.

Most areas of this soil are farmed. This soil has good potential for cultivated crops, hay, pasture, and trees. The potential for recreation uses is poor, the potential for wildlife use is fair to good, and the potential for engineering uses is poor.

This soil is suited to corn, soybeans, grain sorghum, wheat, and grasses and legumes. Flooding and seasonal wetness are the main problems. Levees can prevent flooding but are not practical in most areas. The seasonal water level can be reduced by ditches or by tile if an outlet is available. The choice of plants is restricted in some years, and flooding occasionally destroys crops before harvest.

This soil is suited to trees, and many areas remain in native hardwoods. Adapted species grow well if plant competition is controlled or removed by site preparation or by spraying, cutting, or girdling. Wetness and flooding restrict the use of equipment for planting or harvesting trees and often delay these operations.

This soil is generally unsuited to building sites or onsite waste disposal because of wetness and flooding. Measures that overcome flooding are usually not practical, but flooding can be prevented by levees. Capability subclass IIIw; woodland suitability subclass 2w.

338A—Hurst silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on broad, gently undulating drainage divides. Individual areas of this soil are irregularly shaped or rounded and range from about 5 to 1,000 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 10 inches thick. The subsurface layer is mottled, light gray silt loam in the upper 6 inches and mottled, light brownish gray light silty clay loam in the lower 4 inches. The upper 14 inches of the subsoil is mottled, brown silty clay. The lower 27 inches is mottled, grayish brown heavy silty clay and silty clay loam. The substratum to a depth of about 65 inches is grayish brown light silty clay with mottles. In some places the surface layer is very dark grayish brown. In other places the subsoil is less clayey; the upper part is silty clay loam, and the lower part is silt loam.

Included with this soil in mapping are a few areas that are sandy at the surface and other areas that are wet for extended periods. Also included are a few areas of this Hurst soil where slopes are short and steep, a few minesink areas, and a few areas of the better drained Colp soils on knolls and on slightly higher rises. Inclusions make up from 2 to 5 percent of this unit.

Water and air move through this soil at a very slow rate, and surface runoff from cultivated areas is slow. Reaction ranges from extremely acid to medium acid in the subsoil and varies widely in the surface layer as a result of local liming practices. The surface layer is friable and easily tilled but slow to dry. It tends to crust or puddle after hard rains because of low organic-matter content and poor structure. The platy subsurface layer is difficult to penetrate by roots and water and tends to "perch" water. Available water capacity is moderate.

Most areas of this soil are farmed. This soil has fair potential for cultivated crops, hay, pasture, and trees. The potential for recreation uses is fair to poor, and for wildlife uses it is fair to good. The potential for most engineering uses is poor.

This soil is suited to corn, soybeans, grain sorghum, wheat, and grasses and legumes. The wetness hazard and surface crusting are the main problems of management. Shallow ditching will remove the excess surface water, but the choice of plants is limited in some years by wetness. Returning crop residue or adding other organic

material to the surface helps reduce crusting and increase water intake. Disrupting the platy subsurface layer by deep plowing or chisel plowing increases water intake and enhances root growth.

The use of this soil for pasture or hay is not extensive, but wetness-tolerant grasses and legumes grow well if proper amounts of fertilizer are added. Overgrazing when the soil is wet can cause surface compaction and reduce water intake. Excess water can be removed by shallow ditches.

This soil is suited to trees, and some areas remain in native hardwoods. There are no hazards or limitations in planting or harvesting trees.

This soil is not well suited to building sites because of wetness. Excess water can be removed by shallow ditches. Sewage lagoons will function well on this soil. Streets and roads require proper banking and grading to reduce shrink-swell and frost action. Capability subclass IIIw; woodland suitability subclass 3o.

338B2—Hurst silt loam, 2 to 6 percent slopes, eroded. This gently sloping, somewhat poorly drained soil is on undulating drainage divides, at the head of drainageways, and on side slopes along drainageways. Individual areas of this soil are rounded, elongated, or irregular in shape and range from 4 to 100 acres in size.

Typically, the surface layer is grayish brown silt loam about 7 inches thick. It ranges from 4 to 9 inches in thickness over most of the area. The subsoil is about 39 inches thick. The upper 12 inches is mottled brown silty clay. The lower 27 inches is mottled grayish brown heavy silty clay loam. The substratum to a depth of about 65 inches is mottled grayish brown heavy silty clay loam with mottles. In some places the surface layer is very dark grayish brown. In other places the subsoil contains less clay; the upper part is silty clay loam, and the lower part is silt loam.

Included with this soil in mapping are a few small severely eroded areas, a few small wet depressions, and areas that have received sandy overwash. Also included are small areas of similar soils where slopes are short and steep and a few areas of better drained Colp soils on small knolls and along drainageways. Inclusions make up about 5 percent of this unit.

Water and air move through this soil at a very slow rate, and surface runoff from cultivated areas is medium. Reaction ranges from extremely acid to medium acid in the subsoil and varies in the surface layer as a result of local liming practices. The surface layer is friable to firm and generally easy to till, but it is slow to dry. It tends to crust or puddle after hard rains because of poor structure, low organic-matter content, and increased clay in the surface layer as a result of mixing with the subsoil. Available water capacity is moderate.

Most areas of this soil are farmed. This soil has fair potential for cultivated crops, hay, pasture, and trees. The potential for recreation is poor to fair, and the potential for wildlife is fair to good. The potential for most engineering uses is poor.

This soil is suited to soybeans, grain sorghum, wheat, and grasses and legumes for hay and pasture. Erosion is the main hazard. Natural fertility is low. Minimum tillage, winter cover crops, and grassed waterways help to reduce soil erosion. Returning crop residue to the soil or regularly adding other organic material helps to improve fertility, reduce crusting, and increase water intake. Additions of lime and fertilizers, especially nitrogen, are necessary to improve production.

The use of the soil for pasture or hay helps in controlling erosion. This soil should be fertilized according to tests. Wetness-tolerant plants should be used to establish a good protective cover. Restricted grazing during wet periods keeps the pasture and soil in good condition.

This soil is suited to trees, and some areas remain in native hardwoods. There are no hazards or limitations once the stand is established and the soil is protected from erosion.

Wetness, the shrink-swell potential, and potential frost action are limitations if this soil is used for structures. Proper banking and ditching will reduce excess water. Onsite waste disposal is not feasible because of wetness and very slow permeability. Sewage lagoons can function well, but slope can hamper installation. Capability subclass IIIe; woodland suitability subclass 3o.

382—Belknap silt loam. This nearly level, somewhat poorly drained soil is on bottom lands. Individual areas of this soil are elongated or irregular in shape and range from 4 to about 500 acres in size.

Typically, the surface layer is dark grayish brown and brown silt loam about 8 inches thick. The upper 9 inches of the substratum is mottled, yellowish brown silt loam. The next 13 inches is mottled, grayish brown silt loam. The lower 37 inches is mottled, light brownish gray silt loam. In some places the lower part of the substratum consists of a firm, slightly brittle layer. In other places the substratum has a reaction ranging from neutral to medium acid. A few areas have a silty clay loam surface layer.

Included with this soil in mapping are small areas that have a sandy surface, a few low wet areas, and areas having short, steep slopes. Also included are a few small areas of Burnside soils at the head of some narrow bottom lands and many areas of the less permeable Banlic soils on bottom lands but at a slightly higher elevation than this Belknap soil. Inclusions make up about 15 percent of this unit.

Water and air move through this soil at a moderate to moderately slow rate, and surface runoff is slow. Reaction in the substratum is strongly acid or very strongly acid. The surface layer varies in reaction because of local liming practices. The surface layer is friable and easily tilled. Organic-matter content is low, and available water capacity is very high. Flooding is a problem and damages crops in some years.

Most areas of this soil are farmed. This soil has good potential for cultivated crops, hay, pasture, and trees. The potential is fair to poor for recreational uses and fair to

good for wildlife uses. It is poor for most engineering uses.

This soil is suited to corn, soybeans, grain sorghum, wheat, and grasses and legumes. The hazard of flooding is the main management concern. Dikes and levees can protect against floods but generally are not practical. Because of flooding, time of planting is affected on wide bottoms and along major streams in some years, and the choice of crops is reduced.

Hay and pasture quality and stands are reduced by flooding, the high seasonal water level, and high potential frost action. Shallow ditches remove excess water quickly and reduce frost action damages. Wetness-tolerant grasses and legumes should be planted to maintain an adequate stand. Grazing or cutting should be deferred during wet periods to keep the crop and soil in good condition.

The soil is well suited to trees, and many areas remain in native hardwoods. Seedlings survive and grow well if competing vegetation is controlled or removed by proper site preparation, by spraying, or by cutting or girdling. There are no other serious limitations to be concerned about when planting or harvesting.

This soil is generally unsuited to building sites, onsite waste disposal, or roads because of the flooding hazard. Protection can be provided by levees, but levees are not practical in most areas. Capability subclass IIw; woodland suitability subclass 2o.

420—Piopolis silty clay loam. This nearly level, poorly drained soil is on flood plains along streams. Individual areas of this soil are elongated or irregular in shape and range from about 10 to more than 1,000 acres in size.

Typically, the surface layer is mottled, dark grayish brown and grayish brown light silty clay loam about 7 inches thick. The substratum to a depth of about 66 inches is mottled light grayish brown silty clay loam. In some places the upper part of the substratum is light silty clay. In other places the lower part of the substratum is mottled, grayish brown silt loam.

Included with this soil in mapping are small areas of soils on short, steep slopes, soils in areas along drainageways where bedrock crops out, and soils in a few areas where water ponds for extended periods. Also included are areas of the more silty Bonnie soils and a few small areas of the more clayey Jacob soils. Jacob soils are on slight rises at the edge of the flood plain. Inclusions make up about 5 percent of this unit.

Water and air move through this soil at a slow rate, and runoff from cultivated areas is slow. Reaction is strongly acid or very strongly acid in the subsoil and varies in the surface layer because of local liming practices. The surface layer is firm and is somewhat difficult to till. It dries slowly and forms clods if it is worked when wet. Organic-matter content is low, and available water capacity is high. Flooding and a seasonal high water level restrict use.

Most areas of this soil are in native hardwoods. Some areas are farmed. This soil has poor to fair potential for cultivated crops, hay, and pasture. The potential for trees is fair to good, for recreation uses it is poor, for wildlife it is mostly fair to good, and for most engineering uses it is poor.

This soil is suited to corn, soybeans, and grasses and legumes for hay and pasture, but during most years the choice of crops is limited by flooding. Flooding and wetness are the main hazards. They can be overcome by building levees to protect the soil and by installing pumps to remove excess water from within the protected areas, but these measures are not practical in most areas.

Hay and pasture crops are suited and grow well, but wetness limits the choice of plants and flooding reduces plant quality. Wetness-tolerant grasses and legumes should be planted, and excess water should be drained using shallow ditches. Restricting grazing when the soil is too wet keeps the pasture in good condition.

This soil is suited to trees, and most areas remain in native hardwoods. Growth is improved greatly if competing vegetation is removed or controlled by cutting, by girdling, or by spraying. Equipment use is limited by wetness and flooding, and hand planting is often necessary. Seedling mortality can be reduced by planting adapted species.

This soil is generally unsuited to building sites or structures unless protected from flooding. Flooding can be controlled in most areas by levees, although they often are not economical or practical. Capability subclass IIIw; woodland suitability subclass 2w.

W420—Piopolis silty clay loam, wet. This nearly level to depressional, very poorly drained soil is on meandering flood plains and occurs in old channels, sloughs, and other low-lying areas. Individual areas are mostly elongated in shape and range from about 5 to 40 acres in size.

Typically, the surface layer is mottled, dark grayish brown light silty clay loam about 7 inches thick. The substratum to a depth of about 66 inches is mottled gray silty clay loam with some layers of clay loam in the lower part. In some places the lower part of the substratum is silty clay; in other places it is silt loam.

Included in mapping are areas of this soil where water does not pond for extended periods. Also included are areas of the silty Bonnie soils that occur in similar positions as this Piopolis soil. Inclusions make up about 10 to 15 percent of this unit.

Water and air move through this soil at a slow rate, and runoff is ponded. The surface layer remains wet for extended periods because of ponding, flooding, and a seasonal high water level. Organic-matter content is low, and available water capacity is high.

Most areas of this soil are in native hardwoods, and a few areas are in pasture. This soil has poor potential for cultivated crops, hay, and pasture and fair potential for trees. The potential for some wildlife uses is good, and for recreation and most engineering uses it is poor.

This soil is not suited to cultivated crops and hay because of the extreme wetness hazard. A few areas are used for pasture, but the quality is poor and the period of

use is usually short. The wetness hazard is difficult to overcome without great expense, and levees and pumps are needed to protect and adequately drain this soil.

This soil is suited to trees. Hazards include equipment limitations and seedling mortality. Most areas can be hand planted during drier periods with wetness-tolerant trees that are adapted to the site. Competing vegetation should be removed by cutting or girdling.

Many areas of this soil are suited to wetland plants and are excellent habitat for wetland wildlife. There are some shallow water areas, and many others could be easily developed. The extreme wetness limits the choice of plants that can provide food for wildlife.

This soil is generally unsuited to building sites or onsite waste disposal because of wetness and flooding hazards. A system of levees and pumps or filling the area is necessary to overcome the limitations. Capability subclass Vw; woodland suitability subclass 2w.

426—**Karnak silty clay.** This nearly level to depressional, poorly drained or very poorly drained soil is in broad, flat areas and narrow, low-lying channels or sloughs on bottom lands. Individual areas are mostly elongated in shape and range from 10 to about 400 acres in size.

Typically, the surface layer is very firm, very dark gray silty clay about 6 inches thick. The subsoil is about 48 inches thick. The upper 11 inches is dark gray clay with dark brown mottles. The lower part is gray clay with yellowish brown mottles. The substratum to a depth of 60 inches is gray silty clay loam with strong brown mottles.

Included with this soil in mapping are small areas that remain wet for extended periods and small areas that have sandy overwash. A few areas of Dupo soils in slightly higher areas are also included. Inclusions make up 2 to 5 percent of this unit.

Water and air move through this soil at a very slow rate, and surface runoff is slow to ponded. Reaction ranges from strongly acid to neutral in the subsoil and varies in the surface layer as a result of liming. Shrink-swell potential is very high, and wide cracks develop in the surface layer during dry periods. The surface layer is very firm and difficult to till, and it dries slowly. Clods form if the surface is worked when wet. Organic-matter content is low to medium, and available water capacity is low to moderate. The seasonal water level is at or near the surface during the spring, and water floods, overflows, or ponds.

Most areas of this soil are farmed or remain in native hardwoods. This soil has poor to fair potential for cultivated crops, hay, pasture, and trees. The potential for recreation use is poor, and the potential for wildlife use is poor to good. The potential for most engineering uses is poor.

This soil is suited to soybeans and grain sorghum if adequate surface drainage is provided. Corn is somewhat less suited because of the low available water capacity and shallow rooting depth. Wheat is often damaged in the winter. Shallow ditches at frequent intervals and land leveling provide adequate drainage for most areas. Deep ditches are necessary to drain low-lying depressions. Surface tilth can be improved by fall plowing and by limiting trips over the field to reduce compaction.

Wetness-tolerant grasses and legumes can be grown for pasture and hay. Restricted use during wet periods will help to keep the pasture and soil in good condition. Draining and protecting from flooding or overflow will increase yields and extend the period of use.

Trees are suited to this soil. Seeding mortality and plant competition are management problems. Hand planting of wetness-tolerant species obtains the best results. Plant competition can be controlled by proper site preparation, spraying, and prescribed burning.

Low-lying areas or depressions that are difficult to drain are suitable for wetland plants and as habitat for wetland wildlife.

This soil is not suited to building sites, roads, or onsite waste disposal systems unless the major limitations are overcome. This wet clayey soil is difficult to work and is unstable on wetting and drying. It has additional limitations of flooding, ponding, or overflow and very slow permeability. Capability subclass IIIw; woodland suitability subclass 3w.

427—**Burnside silt loam.** This nearly level to gently sloping, moderately well drained or well drained soil is on narrow drainageways in areas overlying bedrock. Individual areas of this soil are elongated in shape and range from about 4 to 75 acres in size.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is about 16 inches thick. It is dark yellowish brown silt loam in the upper part and dark brown channery loam in the lower part. The substratum to a depth of about 60 inches is dark brown flaggy sandy loam. In some places the surface layer is stony loam or loam. In other places the subsoil is thicker and the stony loam material is deeper than 30 inches from the surface. In some places reaction is slightly acid or neutral.

Included with this soil in mapping are a few areas where bedrock crops out. Also included are areas of Haymond, Wakeland, and Belknap soils in less sloping positions further away from the head of drainageways and in areas where the valley broadens out. Inclusions make up about 10 to 15 percent of this unit.

Water and air move through this soil at a moderate rate, and surface runoff is slow to medium. Reaction ranges from very strongly acid to medium acid but is usually medium acid and strongly acid. The surface layer is very friable and dries quickly after rains. Organic-matter content is low, and available water capacity is moderate. Root development is restricted below a depth of about 24 inches by bedrock fragments. This soil is flooded occasionally, but the flooding is brief.

Most areas of this soil are in pasture or in native hardwoods. This soil has fair potential for cultivated crops, hay, pasture, and trees, fair to good potential for most recreation uses, good potential for most wildlife uses, and poor potential for engineering uses.

This soil is suited to soybeans, grain sorghum, and grasses and legumes for hay and pasture. Few areas are used for row crops because they are generally inaccessible and small. Flooding is the main hazard, and protecting most areas from flooding is impractical.

Grasses and legumes grow well if properly fertilized and managed to keep out competing vegetation. Clipping and spraying pastures will control undesirable plants.

This soil is well suited to trees. Tree seeds and seedlings survive and grow well if competing vegetation is controlled or removed by proper site preparation or by spraying, cutting, or girdling. There are no hazards or limitations to planting or harvesting trees. Many areas, however, have limited access because of the surrounding topography, which often includes bedrock escarpments.

This soil is generally unsuited to building sites because of the flooding hazard. Areas protected by levees can be developed. Capability subclass IIs; woodland suitability subclass 1o.

428—Coffeen silt loam. This nearly level, somewhat poorly drained soil is on the lower parts of stream terraces and alluvial fans. Individual areas of this soil are elongated or irregular in shape and range from 10 to about 40 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 17 inches thick. The subsoil is silt loam about 47 inches thick. It is dark brown and brown in the upper part and grayish brown and brown in the middle part. The lower part is yellowish brown and grayish brown. The substratum to a depth of 76 inches is pale brown and grayish brown silt loam. In some places the lower part of the subsoil and the substratum are silty clay or clay. In other places the surface layer is not so dark colored.

Included with this soil in mapping are a few areas of Raddle and Dupo soils. Raddle soils are in slightly higher positions, and Dupo soils are in lower positions. Inclusions make up about 5 percent of this unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is slow. Reaction ranges from medium acid to neutral. The surface layer is friable and easily tilled. Organic-matter content is medium, and available water capacity is very high.

Most areas of this soil are farmed. This soil has good potential for cultivated crops, hay, pasture, and trees. The potential for recreation use is mostly fair, for wildlife use it is good to fair, and for most engineering uses it is poor.

This soil is well suited to corn, soybeans, wheat, and grasses and legumes for hay and pasture. Most areas are suitable for double cropping. The main problems are a seasonal high water table and occasional overflow by water coming in from the uplands. The high water table can be corrected by a tile drainage system and overflow can be controlled by ditches and diversions.

This soil is not well suited to building site development or onsite waste disposal because of flooding and wetness hazards. If the soil is protected from overflow by ditches and levees, structures can be safely built on this soil. Capability class I; woodland suitability subclass 2w.

430A—Raddle silt loam. This nearly level to very gently sloping, moderately well drained or well drained soil is on stream terraces and at the base of upland slopes adjoining bottom lands. Areas of this soil are elongated or rounded and range from 10 to 250 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 12 inches thick. The subsoil is about 53 inches thick. The upper 5 inches is dark brown silt loam. The next 6 inches is dark yellowish brown silt loam. The lower 42 inches is dark yellowish brown silt loam with pale brown and light brownish gray mottles. The substratum to a depth of about 70 inches is mottled yellowish brown silt loam. In some places the surface layer is thinner and is dark brown.

Included with this soil in mapping are a few small areas of sandy soils, a few low areas of soils that are wet, and a few areas of this Raddle soil on short, steep slopes and in sloping areas where erosion is a hazard. Inclusions make up about 15 percent of this unit.

Water and air move through this soil at a moderate rate, and surface runoff is slow to medium. Reaction ranges from medium acid to neutral. The surface layer is friable and easily tilled. Organic-matter content is medium, and available water capacity is very high.

Most areas of this soil are farmed. This soil has good potential for cultivated crops, hay, pasture, and trees. The potential for most recreation and wildlife uses is good, and for most engineering uses it is good to fair.

This soil is well suited to corn, soybeans, wheat, and grasses and legumes. Most areas are suitable for double cropping. The main problem is controlling runoff from upland slopes. Runoff can safely be diverted by shallow ditches or grassed waterways. The more sloping soils in included areas will erode if they are intensively farmed, but they can be protected if zero tillage or minimum tillage and contour farming are used.

This soil is suited to building site development and onsite waste disposal if overflow water coming from the uplands is controlled or diverted. Local streets and roads should be protected from frost action by proper banking and ditching to remove excess water. Capability class I.

456—Ware loam. This nearly level to gently sloping, moderately well drained or well drained soil is on undulating ridges and natural levees along old channels and sloughs on the protected side of the levee on the Mississippi River flood plain. The areas are elongated and range from 4 to more than 200 acres in size.

Typically, the surface layer is very dark grayish brown and very dark brown loam about 14 inches thick. The subsoil is about 7 inches thick. It is mixed brown and very dark grayish brown very fine sandy loam. The substratum to a depth of about 60 inches is yellowish brown and grayish brown very fine sandy loam with layers of loamy very fine sand. In some places the substratum is loamy fine sand and sand.

Included with this soil in mapping are a few areas of soils that are sandy at the surface, soils in a few small wet areas, a few areas of soils on short, steep slopes, and

a few areas of soils that have a loamy fine sand subsoil. Also included are a few areas of Medway soils having a slope that is similar to that of this Ware soil and a few areas of this Ware soil having slopes of up to about 10 percent. Inclusions make up about 10 to 15 percent of this unit.

Water and air move through this soil at a moderate to moderately rapid rate, and surface runoff from cultivated areas is slow to medium. The surface layer is friable and easily tilled. It dries quickly after rains and warms up early in the spring. Organic-matter content is medium, and available water capacity is moderate to high.

Most areas of this soil are farmed. The soil has fair to good potential for cultivated crops, hay, pasture, trees, and some special crops. It has fair to good potential for recreation uses, good potential for most wildlife uses, and fair potential for most engineering uses.

This soil is suited to corn, soybeans, grain sorghum, wheat, and grasses and legumes. The limited water supplying capacity is the main concern of management. Crops that can tolerate drought or that mature before hot, dry weather arrives should be favored. Wind erosion is a problem in sandy areas but can be controlled by planting a cover crop or by keeping the surface rough. Water erosion is a problem in sloping areas but can be reduced by planting cover crops, by zero tillage, or by contour farming.

Legumes and grasses grow well in areas that have been properly fertilized and maintained by clipping or spraying.

Special crops, such as fruits and vegetables, are suited to this soil, but the supply of available water is somewhat limited. This soil is suitable for irrigation, and a ready supply of water is available. A few areas are subject to ponding by internal drainage water when the levee gates are closed, which happens rarely. These areas could be protected by a pumping system.

This soil is generally unsuited to building sites because of a flooding hazard. Contamination of underground water is a hazard if onsite waste disposal systems are installed on this soil. Capability subclass IIs.

F456—Ware sandy loam, frequently flooded. This nearly level to gently sloping, moderately well drained or well drained soil is on undulating ridges and natural levees along the unprotected site of the levee on the Mississippi River flood plain. Individual areas of this soil are elongated in shape and range from about 5 to 350 acres in size.

Typically, the surface layer is very dark grayish brown sandy loam about 11 inches thick. The substratum to a depth of 60 inches is mixed yellowish brown, pale brown, and light brownish gray in layers ranging from very fine sandy loam to very fine sand. In some places the lower part of the substratum is not stratified and is loamy sand or sand, and in other places it includes layers of silt loam and silty clay loam.

Included with this soil in mapping are a few areas of soils having short, steep slopes, areas of the somewhat poorly drained Medway soils, areas of recently deposited loose sand near the river and along the main overflow channels, and a few areas of this Ware soil on the protected side of the levee. In some areas the surface layer is brown and yellowish brown. A few included areas have slopes of up to 10 percent. Inclusions make up about 10 percent of this unit.

Water and air move through this soil at a moderately rapid rate, and surface runoff is slow. Reaction ranges from mildly alkaline to moderately alkaline and is usually calcareous in the substratum. The surface layer is friable to very friable and easy to till. It dries quickly after rains and warms up early in the spring. Organic-matter content is low to medium, and available water capacity is low to moderate. This soil is subject to frequent flooding.

Most areas of this soil are farmed. This soil has fair potential for cultivated crops, hay, pasture, and trees. The potential for recreation uses is poor to fair, for most wildlife uses it is fair to good, and for engineering uses it is poor.

This soil is suited to corn, soybeans, grain sorghum, wheat, and grasses and legumes. Because of the flooding hazard, crops are subject to some damage or the choice of crops is restricted. Grasses and legumes are not often planted because of the flooding problem. Crops that can tolerate drought are best suited. Wind erosion is a problem but can be controlled by leaving crop residue on the surface and by planting cover crops.

This soil is well suited to trees, and a few areas are in timber. Flooding and deposition are likely to cause some damage to seedlings, and flooding can delay planting and logging operations.

This soil is generally unsuited to building sites or onsite waste disposal systems because of the flooding hazard. Capability subclass IIIw.

457—Booker silty clay. This nearly level, poorly drained or very poorly drained soil is on broad flats and narrow channels on the Mississippi River flood plain. Individual areas of this soil are mostly elongated in shape and range from about 2 to 800 acres in size.

Typically, the surface layer is very dark gray silty clay about 12 inches thick. The subsoil is about 39 inches thick. It is mottled, very dark gray clay. The substratum to a depth of about 75 inches is mottled, dark gray clay. In some places the dark surface layer is less than 10 inches thick. In a few places the substratum contains more sand and is clay loam or loam. In other places the surface layer is silty clay loam. In some areas, reaction in the lower part of the subsoil is neutral.

Included with this soil in mapping are a few areas of soils having short, steep slopes. Also included are small areas of this Booker soil in depressions that remain wet for extended periods. Inclusions make up 2 to 5 percent of this unit.

Water and air move through this soil at a very slow rate, and surface runoff is slow to ponded. Reaction ranges from extremely acid to medium acid in the subsoil and varies widely in the surface layer as a result of local

liming practices. The surface layer is very firm and difficult to till. The soil clods if worked when wet. It is very plastic when wet and very hard when dry. Shrink-swell potential is very high, and wide cracks form when the surface dries. Rooting depth is restricted because of the seasonal high water level, and this soil is subject to overflow by floodwater. Organic-matter content is medium, and available water capacity is low to moderate.

Many areas of this soil are farmed, and many remain in native hardwood trees. This soil has fair potential for cultivated crops, hay, pasture, and trees, poor potential for recreation areas, fair to poor potential for most wildlife uses, and poor potential for most engineering uses.

This soil is suited to corn, soybeans, grain sorghum, wheat, and grasses and legumes if the wetness hazard is controlled. Shallow ditches at frequent intervals and land leveling are commonly used to reduce wetness. Tilth is a problem but can be improved by fall plowing, providing drainage, incorporating crop residue into the surface layer, and practicing minimum tillage to reduce compaction.

Hay and pasture can be grown on this soil if adequate drainage is provided. Wetness-tolerant grasses and legumes should be favored; these grow reasonably well if fertilizers are added according to tests. Pasture rotation and restricted use during wet periods are necessary to keep the pasture and soil in good condition.

This soil is suited to trees, and much of the acreage is in native hardwoods. Seedling mortality, windthrow, plant competition, and equipment limitation are hazards that make growing trees difficult. Wetness-tolerant trees should be planted to reduce seedling mortality and encourage deeper rooting by removing excess water. Plant competition can be reduced by proper site preparation or by spraying, cutting, and girdling. Mechanical planting is not advised because it does not place enough soil around roots of seedlings. Logging operations are generally slowed by the sticky clayey material.

This soil is not well suited to building site development because of wetness, the overflow hazard, and the shrink-swell potential. This soil is difficult to drain because water moves very slowly through it, but excess water can be removed by ditches. Levees protect most areas from serious flooding, but when levee gates are closed, runoff ponds on this soil. Pumps are needed to remove the ponded water. Capability subclass IIIw; woodland suitability subclass 4w.

W457—Booker silty clay, wet. This nearly level, very poorly drained soil is in narrow depressional channels and sloughs and on slightly undulating flats. Individual areas of this soil are elongated in shape and range from about 10 to 700 acres in size.

Typically, the surface layer is very dark gray silty clay about 12 inches thick. It is saturated with water or water is ponded on the surface for extended periods. The subsoil is about 39 inches thick. It is mottled, very dark gray clay. The substratum to a depth of about 75 inches is mottled, dark gray clay. In some places the dark surface layer is less than 10 inches thick. In other places the surface layer is silty clay loam, and a few places have silt loam overwash.

Included with this soil in mapping are areas of the same soil that do not remain wet for extended periods. Also included are areas of Jacob soils in similar positions. Inclusions make up less than 5 percent of this unit.

Water and air move through this soil at a very slow rate, and surface runoff is ponded. Reaction ranges from extremely acid to medium acid in the subsoil. The surface layer is very plastic when wet and very hard when dry. Shrink-swell potential is very high, and wide cracks form when the surface dries. This soil has a water level at or near the surface for extended periods and is subject to flooding. Organic-matter content is medium, and available water capacity is low to moderate.

Most areas of this soil remain in native hardwood trees. This soil has poor potential for cultivated crops, hay, and pasture and for recreation uses, poor to fair potential for most wildlife uses and for trees, and poor potential for most engineering uses.

This soil is not suited to cultivated crops, hay, or pasture because of serious wetness hazards. Drainage with ditches can improve this soil, but outlets are often not available. Deep ditches or tile inlets are usually needed to drain this soil.

Some areas are suited to pasture, but the length of use is limited by wetness. The quality of the pasture is poor because few desirable species can tolerate the wetness.

This soil is suited to trees but has several serious limitations. These are equipment limitations, seedling mortality, windthrow hazard, and plant competition. Hand planting of wetness-tolerant species is necessary to overcome equipment limitations and to reduce seedling mortality. Plant competition can be controlled by proper site preparation or by spraying, cutting, or girdling. Removing excess water will encourage deeper rooting and reduce the windthrow hazard.

This soil is suited to adapted wetland plants and attracts a variety of wetland wildlife. Shallow water areas are easily established in old sloughs and channels.

This soil is generally unsuited to building site development because of the shrink-swell potential, wetness, and the overflow hazard. These problems are difficult to overcome on this low-lying soil and are usually not economically practical to control. Capability subclass Vw; woodland suitability subclass 4w.

533—Urban land. This mapping unit consists primarily of the commercial areas of downtown Carbondale and Murphysboro and densely built-up sections of Southern Illinois University. The areas are rectangular in shape and range from about 50 to 200 acres in size.

Typically, this unit consists of buildings, streets, sidewalks, and parking lots. Interspersed are some natural soil areas and disturbed soil areas that have been filled with bricks and cinders.

Included in mapping are primarily Alvin, Camden, and St. Charles soils in the vicinity of Murphysboro, and

Hosmer and Stoy soils in the Carbondale and Southern Illinois University area. Some areas of Orthents, silty, are also included.

For most uses, onsite investigation is necessary to determine suitability of the particular site.

589—Bowdre silty clay. This nearly level to gently sloping, somewhat poorly drained soil is on narrow ridges along sloughs and overflow channels on the Mississippi River bottom land. Individual areas of this soil are elongated in shape and range from 5 to about 60 acres in size.

Typically, the surface layer is very dark gray silty clay in the upper 5 inches and very dark grayish brown silty clay in the lower 7 inches. The subsoil is about 16 inches thick. The upper 3 inches is dark grayish brown silty clay. The next 4 inches is brown light clay loam. The lower 9 inches is brown very fine sandy loam. The substratum to a depth of about 60 inches is pale brown and yellowish brown very fine sandy loam and loamy very fine sand. In some places the subsoil has no gray color and is brown throughout. In other places the lower part of the subsoil and the substratum are loamy fine sand or sand.

Included with this soil in mapping are a few small areas of soils with sandy overwash and small areas of Medway, Cairo, and Darwin soils. Medway and Cairo soils occupy similar positions as this Bowdre soil, and Darwin soils are in narrow channels, drainageways, and sloughs. A few areas of this Bowdre soil where slopes are short and steep are also included. Inclusions make up about 10 percent of this unit.

Water and air move through this soil at a slow rate in the clayey upper part and at a moderate rate in the loamy lower part. Surface runoff from cultivated areas is slow to medium. Reaction ranges from slightly acid to mildly alkaline in the subsoil and varies widely in the surface layer as a result of local liming practices. The surface layer is very firm and difficult to till. Clods form if this soil is tilled when wet, and cracks form in the surface layer during dry periods. Organic-matter content is medium, and available water capacity is moderate.

Most areas of this soil are farmed and protected from flooding by levees. This soil has fair potential for cultivated crops, hay, pasture, and trees, poor potential for recreation uses, fair to poor potential for wildlife uses, and poor potential for most engineering uses.

This soil is suited to soybeans, grain sorghum, wheat, and grasses and legumes for hay and pasture. Soil tilth and a moderate water supplying capacity are management concerns. The clayey surface layer is difficult to work. Seedbeds are often cloddy, and germination is reduced. Plowing the nearly level areas in the fall helps to improve tilth. The soil should be worked only when dry, and the number of trips over fields should be reduced to prevent compaction. Plants that are drought tolerant or that mature before the dry months are preferred and produce the best yields. Soil cracking disrupts roots and increases desiccation, but this problem can be minimized by maintaining a surface mulch. Sloping areas erode but can be protected by contour farming or by planting winter cover crops.

Grasses and legumes grow well, but uniform stands are difficult to establish because seedbeds are hard to prepare. Once the stands are established, applying fertilizers to maintain growth and deferring use during wet periods keep the crop and soil in good condition.

Building sites and onsite waste disposal systems are not well suited because of the clayey material, the shrink-swell potential, and wetness. Special waste disposal systems should be designed and installed. Footings and footing drain tile for buildings must be installed at a proper depth to reduce the problems of clayey materials, shrink-swell, and wetness. Capability subclass IIw; woodland suitability subclass 2w.

590—Cairo silty clay. This nearly level to very gently sloping, poorly drained soil is on low ridges and flats above overflow channels. Individual areas of this soil are elongated in shape and range from 2 to 300 acres in size.

Typically, the surface layer is very dark grayish brown heavy silty clay about 12 inches thick. The subsoil is about 33 inches thick. The upper part is mottled, grayish brown clay. The next layer is dark grayish brown and dark yellowish brown silty clay. Below that is a thin layer of mottled, dark grayish brown heavy clay loam. The lower part of the subsoil is grayish brown and dark yellowish brown loam that grades to very fine sandy loam. The substratum to a depth of about 60 inches is mottled, grayish brown loamy very fine sand. In some places the clayey material is thicker than 40 inches. In other places the subsoil is medium acid or strongly acid. In places the surface layer is silty clay loam.

Included in mapping are a few areas of soils with sandy overwash, a few areas where slopes are short and steep, and a few areas that remain wet for extended periods. Also included in mapping are areas of Bowdre, Gorham, and Darwin soils. Bowdre soils are in higher positions near the overflow channels, and Gorham soils are in similar positions as this Cairo soil but have less clay and do not crack on drying. Darwin soils are in the narrow channels or depressions in lower positions. Inclusions make up about 10 percent of this unit.

Water and air move through the clayey upper part of this soil at a very slow rate and through the loamy part at a moderate rate. Reaction of the subsoil mostly ranges from slightly acid to mildly alkaline but is medium acid and strongly acid in some places. The surface layer is very firm and difficult to till. Clods can form if this soil is worked when wet. The shrink-swell potential is high, and cracks form in the surface layer during dry periods. Organic-matter content is medium, and available water capacity is moderate to high. This soil has a fluctuating water table that is at or near the surface during the spring, and in some low-lying areas protected by the levee, water ponds when the levee gates are closed.

Most areas of this soil are farmed. This soil has fair potential for cultivated crops, hay, pasture, and trees. The potential for recreation uses is poor, for most wildlife uses it is fair, and for most engineering uses it is poor.

This soil is suited to corn, soybeans, grain sorghum, wheat, and grasses and legumes for hay and pasture. The wetness hazard and tilth are the main problems limiting the use of the soil. Excess water can best be removed by land leveling and ditches. Tile systems do not function well because of the very slow permeability. In low-lying areas crops may be damaged by ponded water during some years, but this damage is normally minor. Surface tilth can be improved by plowing in the fall, by reduced tillage to avoid excess compaction, and by returning crop residue to the surface.

Grasses and legumes grow fairly well if the wetness hazard is reduced. Surface cracking during dry months affects proper root growth and reduces yields. If this soil is pastured, use should be restricted during wet periods to prevent compaction and damage to the stand.

This soil is generally unsuited to building sites because of wetness and the clayey material. Excess surface water can be removed by ditching and land leveling, but the fluctuating water level is difficult to control. If proper design and proper installation procedures are used, certain types of structures can be built on this soil. Capability subclass IIIw; woodland suitability subclass 2w.

682—Medway silty clay loam. This nearly level to gently sloping, somewhat poorly drained soil is on undulating ridges and natural levees along sloughs or overflow channels on the Mississippi River flood plain. Individual areas of this soil are elongated or irregular in shape and range from 2 to about 300 acres in size.

Typically, the surface layer is very dark brown silty clay loam about 17 inches thick. The subsoil is about 19 inches thick. The upper 10 inches is dark brown heavy loam with mottles. The lower 9 inches is dark brown loam with mottles. The substratum to a depth of about 61 inches is mottled brown and pale brown very fine sandy loam. In some places the subsoil lacks the grayish mottles and is dark brown throughout. In other places, the subsoil is thinner and the substratum is fine sand or sand.

Included with this soil in mapping are a few areas of soils with sandy overwash, a few low-lying areas of wet soils, and a few areas of soils where slopes are short and steep. Also included are a few areas of Ware, Bowdre, and Gorham soils. Ware soils are mainly on slightly higher ridgetops than Medway soils. Bowdre soils occupy similar positions as Medway soils, but the surface layer is more clayey and cracks on drying. Gorham soils are in lower positions and are poorly drained. Inclusions make up about 5 to 10 percent of this unit.

Water and air move through this soil at a moderate rate, and surface runoff is slow to medium. Reaction ranges from medium acid to mildly alkaline in the subsoil and varies in the surface layer because of local liming practices. The surface layer is friable to firm and easily tilled. Organic-matter content is medium, and available water capacity is high.

Most areas of this soil are farmed. This soil has good potential for cultivated crops, hay, pasture, trees, and special crops. The potential for most recreation uses is poor to good, for openland wildlife it is good, and for most engineering uses it is poor.

This soil is well suited to corn, soybeans, wheat, and grasses and legumes. There are no serious limitations. A few of the more sloping areas are subject to erosion but can be protected by winter cover crops, zero tillage, and contour farming. Surface tilth in the nearly level areas can be improved by plowing in the fall and by returning crop residue to the surface. Shallow ditches are often used to remove excess surface water from the undulating or low-lying areas.

Special crops, such as pumpkins, and a variety of vegetables are suited to this soil and grow well if properly fertilized.

Grasses and legumes grow well if adapted species are planted and fertilized according to their needs. Some damage by frost heave is likely if drainage is not provided. Surface drainage can be provided by ditches, and the fluctuating water level can be lowered by tile if outlets are available.

This soil is not suited to building sites because of the wetness hazard, which can be reduced by surface drains and tile. Streets and roads are subject to frost action. Onsite waste disposal filter fields will not function adequately because of the high water table. Capability class I; woodland suitability subclass 2w.

F682—Medway soils, frequently flooded. These nearly level to gently sloping, somewhat poorly drained soils are on broad, low ridges and natural levees along overflow channels that are primarily on the unprotected side of the levee on the Mississippi River flood plain. Individual areas of this unit are elongated or irregular in shape and range from 4 to about 500 acres in size.

The surface layer is about 14 inches thick and ranges from very fine sandy loam to silty clay loam. The substratum to a depth of about 65 inches is mixed dark grayish brown, grayish brown, and very dark gray layers of loam, silt loam, and silty clay loam in the upper part and yellowish brown and grayish brown loamy very fine sand in the lower part. In some places, layers of silty clay and layers of sand are in the substratum.

Included in mapping are a few areas of soils with recent sandy overwash and areas of soils where slopes are short and steep. Also included are areas of Darwin soils in low-lying, narrow overflow channels, areas of the more sandy Ware soils on knolls or at the edge of overflow channels, and a few areas on the protected side of the levee. Inclusions make up about 15 percent of this unit.

Water and air move through these soils at a moderate rate, and surface runoff is slow. Reaction ranges from neutral to moderately alkaline, and the substratum is calcareous in most places. The surface layer is friable to firm and easily tilled. Organic-matter content is medium, and available water capacity is high. These soils are flooded frequently but usually not for long periods. Included areas on the protected side of the levee are not subject to flooding.

Most areas are farmed. These soils have poor to fair potential for cultivated crops, hay, and pasture, good potential for trees, poor potential for most recreation uses, and good potential for most wildlife uses.

The soils are suited to corn, soybeans, grain sorghum, wheat, and grasses and legumes. The flooding hazard, however, limits use, and in some years crops are damaged or destroyed by floodwater. A few of the more sloping areas are subject to erosion but can be protected by winter cover crops, zero tillage, and contour farming.

This mapping unit is suited to trees, and a few areas remain in native hardwoods. Seedling mortality and plant competition are problems that affect management most. Flooding and deposition are likely to result in some damage to young seedlings. Plant competition can be controlled by proper site preparation or by spraying, cutting, or girdling. Equipment use is sometimes limited by flooding on this unit and on adjoining low-lying soils.

This unit is not suited to building sites or onsite waste disposal because of frequent flooding. Overcoming the flooding hazard is not practical in most areas. Capability subclass IIIw; woodland suitability subclass 2w.

787—Banlic silt loam. This nearly level to very gently sloping, somewhat poorly drained soil is on slight rises on broad bottom lands and on less distinctive rises on narrow bottom lands. Individual areas of this soil are elongated or irregular in shape and range from about 4 to 200 acres in size.

Typically, the surface layer is mottled, dark grayish brown silt loam about 8 inches thick. The subsurface layer is mottled, brown silt loam about 9 inches thick. The subsoil is about 33 inches thick. The upper 9 inches is mottled, brown silt loam. The lower 24 inches is mottled, brown and light brownish gray, firm and brittle silt loam. The substratum to a depth of about 62 inches is mottled brown and light brownish gray silt loam. In some places the soil material above the firm and brittle material is slightly acid. In other places the brittle zone is weakly expressed.

Included with this soil in mapping are a few areas of soils having short, steep slopes and areas of soils that remain wet for extended periods. Included, primarily on narrow bottom lands, are areas of Bonnie, Belknap, and Haymond soils. These soils generally do not occur in a distinctive pattern. Haymond and Belknap soils, however, are mainly near the streams on natural levees, and Bonnie soils are in low, slight depressions. Inclusions make up 15 percent of this unit.

Water and air move through this soil at a slow rate, and surface runoff is slow. Reaction ranges from medium acid to extremely acid but is mostly strongly acid or very strongly acid in the subsoil. The surface layer varies in reaction because of local liming practices. It is easily tilled but is often wet because water tends to perch above the fragipan, and it tends to crust or puddle after hard rains. Root development is restricted by the dense, brittle layers. Organic-matter content is low, and available water capacity is moderate.

Most areas of this soil are farmed. This soil has fair potential for cultivated crops, hay, pasture, and trees and for recreation uses, fair to good potential for wildlife uses, and fair to poor potential for most engineering uses.

This soil is suited to corn, soybeans, grain sorghum, wheat, and grasses and legumes. The main problems are the perched water table above the dense, brittle layer, surface crusting, and lack of available water for adequate plant growth in most years. Excess water can be removed by ditches, and returning crop residue or regularly adding other organic material helps to improve fertility, reduce crusting, and increase water intake. Grain sorghum and soybeans are more drought tolerant than corn and are less affected by insufficient available water.

This soil is suited to pasture or hay, and legumes and grains grow well if the soil is properly fertilized. Species that are wetness tolerant are preferred. Grazing when the pasture is too wet causes surface compaction and poor tilth. Restricted use during wet periods helps keep the pasture and soil in good condition.

This soil is well suited to trees, and a few areas remain in native hardwoods. Tree seeds and seedlings survive and grow well if competing vegetation is controlled or removed by site preparation, by spraying, or by cutting or girdling. Some windthrow damage is likely but is not a serious problem. The perched water limits use of heavy logging equipment during wet periods.

This soil generally is not suitable for use as building sites. The wetness hazard, the hazard of overflow, and high potential frost action are problems to overcome. Flooding can be controlled by dikes and levees, and installing footings at a proper depth eliminates frost action damage. Footing drain tile and sump pumps can reduce the wetness. Capability subclass IIw; woodland suitability subclass 2o.

801—Orthents, silty, sloping. These nearly level to moderately steep, somewhat poorly drained and moderately well drained soils are mostly in cut and fill areas of silty upland and terrace soils. Individual areas are rectangular or irregular in shape and range from about 5 to 200 acres in size.

Typically, these soils consist of mottled brown silt loam and silty clay loam to a depth of about 60 inches. Reaction is commonly strongly acid to slightly acid. Where terrace soils predominate, this mapping unit is more variable in texture, which ranges from silty clay to loamy fine sand and is similar to that of the adjoining soils.

Included with these soils in mapping are a few areas of soils on levees and in borrow pits that consist of material similar to that of these Orthents. The levee areas have moderately steep side slopes, and the borrow pits have nearly vertical sidewalls and have flat bottoms, some of which are ponded for extended periods. Also included are a few areas of soils that have coarse fragments and other areas of soils that contain cinders, bricks, or organic debris. Inclusions make up 10 to 15 percent of this unit.

Water and air move through these soils at a moderate to slow rate, and surface runoff is rapid to ponded. Reac-

tion ranges from extremely acid to mildly alkaline. The surface is friable to very firm. Organic-matter content is very low, and available water capacity is moderate to high.

Most areas of these soils have been or are being used for construction sites. These soils have poor to fair potential for cultivated crops, hay, and pasture, fair to good potential for trees, and poor to good potential for recreation, wildlife, and most engineering uses.

These soils are suited to corn, soybeans, grain sorghum, wheat, and grass and legumes. Poor tilth, low fertility, and the hazard of erosion are the main problems to overcome when growing cultivated crops. Minimum tillage, crop rotation, and winter cover crops help prevent excessive soil loss and build tilth. Returning crop residue or regularly adding other organic material helps to improve fertility and tilth. Fertilizers should be added as needed to obtain desired yields.

Grasses and legumes grow well if fertilizers are added. Acid areas should be limed. Establishing plants is a problem because of poor tilth and compacted materials. Trees are suited to these soils, but seedling mortality is a problem. The firm soil material is somewhat difficult to compact around roots of seedlings. Growth rates are variable.

These soils are suitable for building site development in places that have been compacted to eliminate settling. Proper design and installation of footings and foundations is necessary to avoid damage from differential settling. Special onsite investigations are needed to determine the proper waste disposal system to install. Capability subclass IVe.

802C—Orthents, loamy, hilly. These gently sloping to moderately steep, well drained soils are on spoil banks of strip mine land where the ridges have been struck off and have been partially leveled. Individual areas of this mapping unit are irregular to rectangular in shape and range from about 40 to 600 acres in size.

Typically, these soils consist of brown stony loam mottled with gray. The fine earth material was derived primarily from glacial till mixed with lesser amounts of loess. The stony fragments are primarily sandstone and shale and lesser amounts of limestone. The fine earth and bedrock fragments are intermixed to the depth of the dig. This intermixing has resulted in textures ranging from loam to silty clay.

Included with these soils in mapping are soils in areas that are nearly level and soils in areas that are not stony at the surface. Also included are soils in haulage roads and mine-spoil piles, which are more uniformly extremely acid because of a high content of shale, coal, and sulfur. Also included are soils in shallow trenches and depressions that hold water, a few deep water areas, and a few steep and very steep areas that are not leveled. Inclusions make up about 10 percent of this unit.

Water and air move through these soils at a moderate rate, and surface runoff is medium to rapid. Reaction ranges from extremely acid to moderately alkaline but is mostly slightly acid to neutral. Stone content ranges from 20 to 35 percent throughout the deposit. Organic-matter content is very low, and available water capacity is moderate.

Most areas of these soils are in pasture. These soils have poor potential for cultivated crops and hay. They have fair to good potential for pasture, for some special crops, for trees, for recreation, for wildlife uses, and for most engineering uses.

These soils are generally not suited to cultivated crops and hay because of the high stone content at the surface. Leveled areas of these soils require special stone-gathering equipment to alter their suitability for crops. Included areas that are nearly stone free at the surface can be used to grow wheat, corn, and soybeans. Fertilizers must be added, and sloping areas should be protected from erosion.

These soils are well suited to grasses and legumes (fig. 10). Low fertility and establishing a good stand are problems. The stony surface prohibits good seedbed preparation, and equipment is subject to damage. Fertilizers, particularly nitrogen, are needed to promote good growth rates. Acid areas should be limed. Seeding, fertilizing, and spraying can be done easiest with airplanes. Rotating pastures to prevent overgrazing and restricting use during wet periods keep the pasture in good condition and help to keep the soil from eroding.

These soils are suited to trees, but the stony surface limits use of mechanical planting equipment. Aerial seeding is a method used to overcome the problem. Survival of seeds and seedlings is variable because soil reaction and droughtiness varies. Surface stoniness also affects harvesting timber products.

Use of these soils for orchards and some small fruits is possible if fertilizers are added according to tests and sloping areas are protected from erosion. Stony surfaces limit the use of some equipment, and large stones should be removed. Sloping areas can be protected with a cover crop.

These soils are suited to building site development and onsite waste disposal. Surface stoniness limits use, but stones can be removed. Fertilizers are needed for adequate growth of grasses in lawns, of trees, and of shrubs. Capability subclass VIs.

802G—Orthents, loamy, very steep. These very steep, well drained soils are on ridges, side slopes, and walls of spoil banks in strip-mine areas. These soils are readily recognized by their very steep slopes, stony surfaces, often barren or sparsely vegetated slopes, and interspersed water areas. Individual areas are 40 to several hundred acres in size and are irregular in shape.

Typically, these soils consist of brown stony loam mottled with gray. The fine earth material was derived primarily from glacial till mixed with lesser amounts of loess. The stony fragments are primarily sandstone and shale and lesser amounts of limestone. The fine earth and bedrock fragments are intermixed to the depth of the dig. This intermixing has resulted in textures ranging from

loam to silty clay. Soil reaction ranges from extremely acid to moderately alkaline.

Included with these soils are a few areas of soils that are similar, except that they have been planted to trees, have lower spoil banks, and contain smaller water areas. They would be less expensive to reclaim. Also included are soils in areas of haulage roads and mine spoil (tailings and washings), which are more uniformly extremely acid because of a high content of shale, coal, and sulphur. These soils are usually nearly level to moderately sloping and have no vegetation. The area to the southeast of Carbondale has soils that contain a higher percentage of acid shale, are generally more acid, and are more sparsely vegetated. Inclusions make up 10 to 15 percent of this unit.

Water and air move through these soils at a moderate rate, and surface runoff is very rapid. Reaction ranges from extremely acid to moderately alkaline but is mostly slightly acid to neutral. Stone content ranges from 20 to 35 about percent throughout the deposit. Organic-matter content is very low, and available water capacity is moderate.

Most areas of these soils are idle, nearly barren land, and some are pastured. These soils have poor to good potential for pasture and trees, poor potential for cultivated crops, poor potential for most recreational and wildlife uses, and poor potential for most engineering uses.

These soils are not suited to cultivated crops because of the high stone content and very steep slopes. Leveled areas of these soils require special stone-gathering equipment to alter their suitability for cropland.

These soils have a limited suitability for pasture because of the very steep slopes. The peaks of the ridges need to be leveled if these areas are to be productive. Soil fertilizers, particularly nitrogen, are needed for good growth. Acid areas need to be limed.

These soils have a limited suitability for trees because of the very steep slopes. Planting and harvesting are restricted by the size and amount of stones. Peaks of the ridges can be leveled to increase suitability and make these soils more productive.

Use of these soils for certain speciality crops is possible if some of the slopes are leveled and large bedrock fragments are removed. Planting to orchards and to some small fruits is especially feasible in areas that are interspersed with water that could be used for irrigation. Soil acidity will affect the choice of plants.

Recreation and wildlife uses of these soils are limited because of the lack of vegetation in many areas and because of very rapid runoff into the water areas from very steep slopes. Leveling some areas, planting desirable vegetation, and stocking water areas capable of supporting fish are ways to improve these soils for these uses.

These soils are not suited to most engineering uses. Controlling erosion, slumping, and settling are problems. Capability subclass VIIs.

805—Orthents, clayey, sloping. These nearly level to moderately steep, very poorly drained to somewhat poorly drained soils are in depressions of borrow pits and on aprons, side slopes, and ridgetops of levees along the Mississippi and Big Muddy Rivers. Individual areas are elongated in shape and range from 5 to about 1,000 acres in size.

Typically, these soils consist of mottled, dark gray silty clay or clay to a depth of about 60 inches. The areas along the Mississippi River have more sandy and silty strata, and reaction ranges from slightly acid to moderately alkaline. The areas along the Big Muddy River are more uniform clayey sediments, and reaction ranges from extremely acid to medium acid. Recent deposits in the borrow areas are variable but are characteristicly more sandy or loamy along the Mississippi River levee and more silty along the Big Muddy River levee.

Included with these soils in mapping are a few areas of soils that are similar but are more loamy or sandy. These soils occur primarily along the northwest corner of the Mississippi River flood plain. Also included are a few areas of soils on the old levee system that have mostly been leveled. Within the depressions are bodies of water, some of which remain permanently ponded. Also included in the depressional borrow pit areas are recent deposits of variable texture in layers that vary in thickness. Inclusions make up 10 to 15 percent of this unit.

Water and air move through these soils at a very slow rate, and surface runoff is rapid to ponded. Reaction ranges from extremely acid to moderately alkaline. Shrink-swell potential is very high, and wide cracks form during dry periods. Organic-matter content is low, and available water capacity is low to moderate. In the depressions water ponds for extended periods.

Most areas of these soils on the sloping levees are covered with grass, and the depressional borrow pits are revegetating with trees. These soils have poor potential for cultivated crops, poor to fair potential for hay, pasture, and trees, poor to fair potential for most recreation and wildlife uses, and poor potential for most engineering uses.

These soils are not suited to cultivated crops because of wetness, slopes, and the high clay content. The level areas are normally too wet for extended periods and are not easily drained. A permanent grass cover protects the sloping levee areas from erosion.

The levee areas are suited to pasture or hay if they are not used during wet periods. Fertilizers, particularly nitrogen, are needed for good growth. Acid areas need to be limed. Most of the borrow pit areas are too wet to be used for hay or pasture.

These soils have limited suitability for trees. Management problems are seedling mortality and equipment limitations. The clayey material is difficult to compact around seedling roots, and overflow waters are likely to damage seedlings. Planting and harvesting equipment can be used only during dry periods.

The nearly level to depressional areas are well suited to wetland wildlife because in many areas water ponds for extended periods. Depth of water could be controlled but is not easily regulated because of the flooding hazard.

These soils are not suited to use as building sites, and they are not suitable for roads because of the shrink-swell potential of the clayey material. Controlling erosion, slumping, and settling are problems in the higher areas, and flooding is a hazard in the low-lying areas. Capability subclass IIIe (levee area), Vw (borrow area).

850D—Hosmer-Hickory silt loams, 12 to 18 percent slopes. This mapping unit consists of strongly sloping, moderately well drained and well drained soils on hillsides above bottom lands and along drainageways. Individual areas of this unit are elongated in shape and range from 4 to 75 acres in size. They are 50 to 70 percent Hosmer soils and 20 to 40 percent Hickory soils. The Hickory soils are on the lower part of the slope, and the Hosmer soils are on the upper part of the slope. These soils occupy narrow bands on short slopes. It is not practical to separate these soils in mapping.

Typically, the Hosmer soil has a surface layer of dark grayish brown silt loam about 3 inches thick and a subsurface layer of yellowish brown silt loam about 5 inches thick. The subsoil is about 40 inches thick. In the upper 13 inches, it is strong brown light silty clay loam grading to mottled yellowish brown heavy silt loam with depth. The lower part of the subsoil, which contains a very firm and compact zone, is about 27 inches thick. It begins at a depth of about 21 inches with a thin, mottled yellowish brown heavy silt loam layer, which has thick, pale brown coatings. Below that is the very firm and compact zone, which is mottled dark yellowish brown silty clay loam grading with depth to firm silt loam. The substratum to a depth of about 60 inches is mottled yellowish brown silt loam. In some places the upper part of the subsoil is thicker, and the very firm, compact lower part of the subsoil is deeper and thinner. In places that have been cultivated, the surface and subsurface layers have been mixed, and the plow layer is dark yellowish brown silt loam about 5 inches thick.

Typically, the Hickory soil has a surface layer of dark grayish brown silt loam about 3 inches thick and a subsurface layer of brown silt loam about 6 inches thick. The subsoil is about 55 inches thick. It is yellowish brown and strong brown, firm clay loam and has mottles in the lower part. The substratum extends to a depth of about 70 inches and is pale brown loam. In places that have been cultivated, the surface and subsurface layers have been mixed, and the plow layer is brown silt loam about 6 inches thick.

Included with these soils in mapping are a few areas of bedrock outcrops and escarpments, a few areas of severely eroded soils and a few areas of Hickory soils on short, steep slopes and escarpments. Also included are areas of Alford, Wellston, and Belknap soils. Alford soils are on less sloping narrow ridgetops or at the upper part of the hillside. Wellston soils are at the head of drainageways or at the base of some slopes. The Belknap soils are on narrow bottom lands along drainageways. In a few areas bands of a more clayey gray soil are included. Inclusions make up about 10 percent of this unit.

Water and air move through the Hickory soil and the upper subsoil of the Hosmer soil at a moderate rate and move through the lower subsoil of the Hosmer soil at a very slow rate. Surface runoff is medium to rapid. Reaction ranges from extremely acid to neutral in the subsoil of the Hickory soil and ranges from extremely acid to strongly acid in the subsoil of the Hosmer soil. The surface layer is friable and easy to till. Organic-matter content is low, and available water capacity is high in the Hickory soil and moderate in the Hosmer soil.

Most areas of this unit are in pasture or in native hardwoods. These soils have poor to fair potential for cultivated crops and fair to good potential for hay, pasture, and trees. The potential for recreation uses is poor to fair, for openland and woodland wildlife it is fair to good, and for most engineering uses it is poor to fair.

This mapping unit is not well suited to cultivated crops, but corn, soybeans, grain sorghum, and wheat can be grown in a rotation that includes grasses and legumes. The main concern of management is erosion if this mapping unit is used as cropland. Minimum tillage, zero tillage, and winter cover crops help to control excess soil losses. A few areas are suitable for contour farming.

These soils are best suited to grasses and legumes for hay and pasture. Grasses and legumes are very effective in controlling erosion if the soils are properly fertilized. When initially establishing the stand, it is best to sow seed in a small grain nurse crop. To renovate pastures, use chemicals to kill undesirable vegetation, disk lightly, and sow seed into the remaining vegetation. Control competing vegetation by clipping or spraying as needed.

This mapping unit is well suited to trees. Management problems are the windthrow hazard of the Hosmer soil and controlling competing vegetation on the Hickory soil. Equipment is somewhat limited by the slopes. Competing vegetation can be controlled by proper site preparation or by cutting or spraying. The windthrow hazard can be lessened or overcome by planting adapted species that have a tap root system. The slopes may need to be hand planted, particularly in areas where steep inclusions occur.

Excessive slopes limit this mapping unit for use as building sites. Where slopes are altered, foundations and footings should be designed to prevent structure damage caused by differential settling of the materials. Capability subclass IVe; woodland suitability subclass 2r for Hosmer soil, 1r for Hickory soil.

850D3—Hosmer-Hickory complex, 12 to 18 percent slopes, severely eroded. This mapping unit consists of strongly sloping, moderately well drained and well drained soils on hillsides above bottom land soils or along side slopes of drainageways. Individual areas are elongated or irregular in shape and range from 5 to 200 acres in size. They are 40 to 65 percent Hosmer soils and 30 to

55 percent Hickory soils. The Hickory soils are at the lower part of the slope, and the Hosmer soils are at the upper part of the slope. These soils occupy narrow bands on short slopes that make separation of these soils in mapping impractical.

Typically, the Hosmer soil has a surface layer of yellowish brown silty clay loam about 4 inches thick. The subsoil is about 34 inches thick. The upper part of the subsoil is strong brown light silty clay loam grading to mottled yellowish brown heavy silt loam with depth. The lower part of the subsoil, which contains a firm and compact zone, is mottled dark yellowish brown silty clay loam grading to silt loam with depth. The substratum to a depth of about 60 inches is mottled strong brown silt loam. In some places the surface layer is silt loam. In some places the upper part of the subsoil is thicker, and the lower part of the subsoil is thinner and deeper.

Typically, the Hickory soil has a surface layer of yellowish brown clay loam about 4 inches thick and consists primarily of subsoil material mixed by plowing. The subsoil is about 45 inches thick. It is yellowish brown and strong brown, firm clay loam throughout and has mottles in the lower part. The substratum to a depth of about 60 inches is pale brown loam. In some places the surface layer is silty clay loam.

Included with these soils in mapping are a few areas of seepy, wet soils and a few areas of soils along drainageways or hillsides where bedrock crops out. Also included are a few areas of soils on short, steep slopes and escarpments on hillsides above bottom lands; a few areas of Alford soils on the upper parts of some slopes and on narrow spur ridges; a few areas, often near seepy spots, where a band of more clayey gray soil occurs; and areas of soils that are gullied or so severely eroded that most or all of the subsoil is removed. Inclusions make up 5 to 10 percent of this unit.

Water and air move through the Hickory soil and the upper part of the Hosmer soil at a moderate rate and move through the lower subsoil of the Hosmer soil at a very slow rate. Surface runoff from cultivated areas is rapid to very rapid. Reaction ranges from extremely acid to neutral in the subsoil of the Hickory soil and from extremely acid to strongly acid in the subsoil of the Hosmer soil. The surface layer is firm, slow to dry, and difficult to till. Clods can form if it is worked when wet, and the surface layer tends to crust or puddle after hard rains. Organic-matter content is very low, and available water capacity is high in the Hickory soil and moderate in the Hosmer soil.

Most areas of these soils are farmed or pastured. These soils have poor to fair potential for cultivated crops, hay, pasture, and trees. The potential for recreation areas is poor to fair, for most wildlife uses it is fair, and for most engineering uses it is poor to fair.

These soils are best suited to grasses and legumes for hay and pasture. Row crops are poorly suited because of steepness of slopes and the erosion hazard. Minimum tillage or zero tillage are needed to control erosion if this mapping unit is used for cultivated crops.

Legumes and grasses are very effective in controlling erosion if the soils are properly fertilized. Initial establishment is difficult and risky because of poor tilth and the erosion hazard. When initially establishing the stand, it is best to sow seed in a small grain cover crop. An area can be renovated by using chemicals to control unwanted vegetation and sowing directly into the remaining vegetation. Preventing overgrazing and restricting use during wet periods help maintain an adequate cover to protect the soils from erosion.

This mapping unit is suited to trees if adapted species are planted. Pine are generally best suited to the Hosmer soil because of the compact zone and low natural fertility. Unlike the Hickory soil, the Hosmer soil has a windthrow hazard. Seedling mortality is likely to be reduced because of the difficulty in compacting soil around roots of seedlings when planting. Slopes and the somewhat clayey surface layer limit equipment use during rainy periods. Logging trails and roads are likely to erode unless they are disked, fertilized, and seeded to establish grass cover.

These soils are not well suited to use as building sites or for onsite waste disposal because of steepness of slopes and the erosion hazard. Some reshaping of slopes is necessary to make sites suitable for development. Bare areas erode rapidly and require fertilizing, seeding, and mulching to prevent excessive erosion. Capability subclass VIe; woodland suitability subclass 2r for Hosmer soil, 1r for Hickory soil.

850E—Hickory-Hosmer silt loams, 18 to 30 percent slopes. This mapping unit consists of moderately steep and steep, moderately well drained and well drained soils on hillsides above bottom lands and along drainageways. Individual areas of this unit are elongated in shape and range from 4 to 40 acres in size. They are 50 to 70 percent Hickory soils and 30 to 50 percent Hosmer soils. The Hickory soils are on the lower and mid parts of the slope, and the Hosmer soils are on the lower part of the slope. These soils occupy narrow bands on short slopes. It is not practical to separate these soils in mapping.

Typically, the Hickory soil has a surface layer of dark grayish brown silt loam about 2 inches thick and a subsurface layer of brown silt loam about 3 inches thick. The subsoil is about 51 inches thick. It is yellowish brown, strong brown, and pale brown, firm clay loam with mottles in the lower part. The substratum to a depth of about 62 inches is pale brown loam. In some places the subsoil is thicker. In some places the upper part of the subsoil is silty clay loam.

Typically, the Hosmer soil has a surface layer of dark grayish brown silt loam about 3 inches thick and a subsurface layer of yellowish brown silt loam about 4 inches thick. The subsoil is about 40 inches thick. The upper part of the subsoil is strong brown light silty clay loam grading to mottled yellowish brown heavy silt loam with depth. The lower part of the subsoil, which contains a very firm and compact zone, is about 27 inches thick. It begins at about 20 inches with a thin, mottled yellowish brown heavy silt loam layer, which has pale brown

coatings. Below that is the very firm and compact zone, which is mottled dark yellowish brown silty clay loam grading with depth to firm silt loam. The substratum to a depth of about 60 inches is mottled yellowish brown silt loam. In many places, the upper part of the subsoil is thicker and the very firm, compact lower part is deeper and thinner.

Included with these soils in mapping are a few areas of bedrock outcrops and severely eroded areas. Also included are areas of Alford soils at the top of hillsides or on less sloping narrow spur ridges, areas of Wellston soils near the head of drainageways or at the lower part of the slope, areas of Belknap soils on narrow bottom land along drainageways, and a few bands of more clayey gray soil. In some areas the Hosmer soil makes up the entire hillside. Inclusions make up about 15 percent of this unit.

Water and air move through the Hickory soil and the upper subsoil of the Hosmer soil at a moderate rate and move through the lower subsoil of the Hosmer soil at a very slow rate. Surface runoff is rapid. Reaction ranges from extremely acid to neutral in the subsoil of the Hickory soil and from extremely acid to strongly acid in the subsoil of the Hosmer soil. The surface layer is friable and easy to till. Organic-matter content is low, and available water capacity is high in the Hickory soil and moderate in the Hosmer soil.

Most areas of this unit are in native hardwoods. These soils have poor potential for cultivated crops and hay and fair to good potential for pasture and trees. The potential for recreation and engineering uses is poor, and for openland and woodland wildlife it is fair to good.

Steep slopes and the erosion hazard limit the use of these soils for cultivated crops or hayland. In the less sloping places this mapping unit can safely be used for hayland, although the use of some types of haymaking equipment is restricted.

These soils are suited to grasses and legumes for pasture if they are fertilized. Grasses and legumes effectively control erosion once they are established, but proper establishment is a problem because of steep slopes and rapid runoff. New pastures should be seeded in a nurse crop to reduce the erosion hazard. Proper stocking rates, pasture rotation, and clipping or spraying are necessary to maintain the pasture once it is established.

This mapping unit is best suited to trees, and most areas remain in native hardwoods. Management problems include windthrow hazard, erosion hazard, and equipment limitations. Planting adapted species, which have top root systems, can reduce the windthrow hazard. The erosion hazard can be reduced by planting trees in a cover crop and by smoothing, fertilizing, and seeding logging roads and trails. The steep parts of this unit should be hand planted.

Steep slopes limit this mapping unit for use as building sites. If slopes are altered, foundations and footings should be designed to prevent structure damage caused by differential settling of the materials. Capability subclass VIe; woodland suitability subclass 2r for Hosmer soil, 1r for Hickory soil.

850E3—Hickory-Hosmer complex, 18 to 30 percent slopes, severely eroded. This mapping unit consists of moderately steep to steep, moderately well drained and well drained soils on side slopes along drainageways or on hillsides above bottom lands. Individual areas are mostly elongated in shape and range from 4 to 25 acres in size. They are 55 to 75 percent Hickory soils and 20 to 40 percent Hosmer soils. The Hickory soils are at the lower and mid parts of the slopes, and the Hosmer soils are at the upper part. These two soils occur as narrow bands. It is not practical to separate these soils in mapping.

Typically, the Hickory soil has a surface layer of dark yellowish brown clay loam about 2 inches thick. The subsoil is about 45 inches thick. It is yellowish brown and strong brown, firm clay loam with mottles in the lower part. The substratum to a depth of about 60 inches is pale brown loam. In some places the surface layer is silty clay loam.

Typically, the Hosmer soil has a surface layer of dark yellowish brown silty clay loam about 2 inches thick. The subsoil is about 34 inches thick. The upper part of the subsoil is strong brown light silty clay loam grading to mottled yellowish brown heavy silt loam with depth. The lower part, which contains a firm and compact zone, is mottled dark yellowish brown silty clay loam grading to silt loam with depth. The substratum to a depth of about 60 inches is mottled strong brown silt loam. In some places the surface layer is silt loam. In other places, the upper part of the subsoil is thicker and the lower part is thinner and deeper.

Included with this unit in mapping are a few areas of Alford and Wellston soils. Alford soils are at the top of the slope and on some narrow spur ridges. Wellston soils are at the base of some slopes. Also included are areas of alluvial soils along the bottoms of narrow drainageways and a few gullied areas. In areas where glacial deposits are thin, mixing with local bedrock has resulted in textures ranging from sandy loam to silty clay. Inclusions make up about 5 to 10 percent of this unit.

Water and air move through the Hickory soil and the upper part of the Hosmer soil at a moderate rate and move through the lower subsoil of the Hosmer soil at a very slow rate. Surface runoff is very rapid. Reaction ranges from extremely acid to neutral in the subsoil of the Hickory soil and from extremely acid to strongly acid in the subsoil of the Hosmer soil. The surface layer is firm, slow to dry, and difficult to till. Organic-matter content is very low. Available water capacity is high in the Hickory soil and moderate in the Hosmer soil.

Most areas of these soils are in pasture or are idle land. The soils have poor potential for cultivated crops and hay. They have fair potential for pasture and trees. The potential for recreation uses is poor, for openland wildlife it is fair, and for most engineering uses it is poor.

These soils are suited to grasses and legumes if they are properly fertilized. Steep slopes and the erosion hazard limit use of these soils for cultivated crops or hayland. Grasses and legumes effectively control erosion once

they are established, but establishment is difficult because of the clayey surface layer and the very rapid runoff from unprotected slopes. New pastures should be seeded in a nurse crop to reduce the erosion hazard. Proper stocking rates, pasture rotation, and clipping or spraying are necessary to adequately maintain the pasture once it is established.

This mapping unit is suited to trees. Management problems include controlling erosion, seedling mortality, and equipment limitations. Planting adapted species on the contour in a low-growing cover crop will reduce seedling mortality and erosion. Steep slopes and the somewhat clayey surface layer limit the period of equipment use.

These soils are not well suited to building site development because of the steep slopes that require reshaping. Streets and roads should be built on the contour to reduce the erosion hazard. Capability subclass VIe; woodland suitability subclass 2r for Hosmer soil, 1r for Hickory soil.

852E—Alford-Wellston silt loams, 15 to 30 percent slopes. This mapping unit consists of moderately steep and steep, well drained soils on long hillside slopes above and below escarpments and along drainageways. Individual areas are elongated or irregular in shape and range from 5 to about 1,000 acres in size. They are 55 to 75 percent Alford soils and 20 to 40 percent Wellston soils. The Alford soils are at the upper and mid parts of side slopes and on convex spur ridges, and the Wellston soils are at the lower part of side slopes and along the lateral drainageways that dissect hillsides in many places. The two soils occupy hillsides in mostly wooded terrain that makes separation of the two soils in mapping impractical.

Typically, the Alford soil has a dark grayish brown silt loam surface layer about 3 inches thick. The subsurface layer is yellowish brown silt loam about 7 inches thick. The subsoil is about 50 inches thick. The upper part is strong brown silty clay loam. The next part is brown light silty clay loam. The lower part is brown heavy silt loam. In some places the subsoil contains less clay and is heavy silt loam in the upper and middle parts.

Typically, the Wellston soil has a dark grayish brown silt loam surface layer about 1 inch thick. The subsurface layer is 5 inches of yellowish brown silt loam. The subsoil is about 44 inches thick. The upper part is strong brown heavy silt loam grading to silty clay loam with depth. The lower part, in residuum, is strong brown heavy silt loam grading to heavy loam with depth. Fractured sandstone and siltstone bedrock are at a depth of about 50 inches. In some places there are coarse fragments throughout the profile. In other places the bedrock is deeper than 72 inches. In places where the residuum is derived from shale or limestone, the lower part of the subsoil is silty clay.

Included with these soils in mapping are a few limestone sinkholes, a few severely eroded areas, and areas of bedrock outcrops, ledges, and escarpments. Also included are areas of Neotoma, Hickory, Hosmer, and Burnside soils. Neotoma soils are at the head of some drainageways or adjacent to bedrock escarpments. Hickory soils are at the base of some slopes, and Hosmer soils are on foot slopes or at the top of the hillside. Burnside soils are along the small, narrow streams. Inclusions make up 5 to 15 percent of this unit.

Water and air move through these soils at a moderate rate, and surface runoff is rapid. Reaction ranges from very strongly acid to medium acid in the subsoil of the Alford soil and from extremely acid to strongly acid in the subsoil of the Wellston soil. Organic-matter content is low, and available water capacity is high.

Most areas of these soils are in woodland. These soils have poor potential for cultivated crops, poor to fair potential for hay and pasture, and fair to good potential for trees. The potential for most recreation uses is poor, and the potential for openland and woodland wildlife is fair to good.

These soils are suited to grasses and legumes in areas that have been cleared. The less sloping areas are suited to hayland, and the more sloping areas should be in pasture. The steep slopes limit the use of haymaking equipment. Legumes and grasses grow well if properly fertilized. Competing vegetation should be removed by spraying or clipping. Pasture rotation, proper stocking rates, and restricted grazing during wet periods are necessary to maintain the protective vegetative cover and control erosion.

These soils are best suited to trees. Competing vegetation, the erosion hazard, and equipment limitations are problems for management. Competing vegetation can be controlled or removed by proper site preparation or by spraying, cutting, or girdling. The steep slopes and bedrock outcrops and escarpments restrict the ease of planting or harvesting trees on these soils, particularly in areas of Wellston soil. These soils are easily eroded where areas are exposed during logging operations, and trails and roads should be smoothed, fertilized, and seeded to provide a protective cover.

This mapping unit is generally unsuited to use as building sites or for onsite waste disposal because of steep slopes. Roads are difficult to build and maintain because of the severe erosion hazard in exposed areas and the interference of bedrock materials. Capability subclass VIe; woodland suitability subclass 1r for Alford soil, 2r for Wellston soil.

852G—Alford-Wellston silt loams, 30 to 50 percent slopes. This mapping unit consists of very steep, well drained soils on hillsides and along drainageways. Individual areas of this unit are irregular or elongated in shape and range from 5 to 400 acres in size. They are 40 to 60 percent Alford soils and 30 to 50 percent Wellston soils. The Alford soils are on the upper part of side slopes, and the Wellston soils are on the lower part of side slopes. The two soils occupy very steep, heavily wooded terrain, so mapping these soils separately would be impractical.

Typically, the Alford soil has a surface layer of very dark grayish brown silt loam about 2 inches thick. The subsurface layer is yellowish brown silt loam about 5 inches thick. The subsoil is about 45 inches thick. It is brown silt loam in the upper part. The next part is strong brown light silty clay loam. The lower part is yellowish brown silt loam. The substratum to a depth of about 60 inches is yellowish brown silt loam. In some places the subsoil is thinner and contains less clay. Also, in some places, the substratum contains free lime.

Typically, the Wellston soil has a surface layer of dark grayish brown silt loam and a subsurface layer of yellowish brown silt loam. The subsoil is about 44 inches thick. The upper part, in loess, is strong brown heavy silt loam grading to silty clay loam with depth. The lower part, in residuum, is strong brown heavy silt loam grading to heavy loam with depth. Fractured sandstone and siltstone bedrock is at a depth of about 50 inches. In some places there are coarse fragments throughout the profile. In other places the bedrock is deeper than 72 inches, and occasionally it is limestone.

Included with these soils in mapping are a few limestone sinkholes, a few severely eroded areas, and a few areas of bedrock escarpments. Also included are areas of Neotoma soil at the head of some drainageways or adjacent to bedrock escarpments, areas of Hickory soils at the base of some slopes, and a few narrow areas of Burnside soils along drainageways. Inclusions make up about 10 to 15 percent of this unit.

Water and air move through these soils at a moderate rate, and surface runoff is rapid to very rapid. Reaction of the Alford soil ranges from very strongly acid to medium acid, and reaction of the Wellston soil ranges from extremely acid to strongly acid. Organic-matter content is low, and available water capacity is high.

Most areas of these soils are in woodland. These soils have poor potential for cultivated crops, hay, and pasture. The potential for most recreation and engineering uses is poor, and the potential for woodland wildlife is good.

These soils are best suited to trees. The very steep slopes limit the use of these soils. Trees grow well and protect the slopes from erosion. Areas exposed by logging erode rapidly if they are not seeded. The very steep slopes and bedrock escarpments hinder cutting and hauling operations, and special equipment is often needed.

These soils are not suited to building site development because of very steep slopes. Roads are difficult to build and maintain because of the severe erosion hazard in exposed areas. Capability subclass VIIe; woodland suitability subclass 1r for Alford soil, 2r for Wellston soil.

929C3—Ava-Hickory complex, 7 to 12 percent slopes, severely eroded. This mapping unit consists of sloping, moderately well drained and well drained soils on side slopes along drainageways and hillsides above bottom land soils. Individual areas of this unit are mostly elongated in shape and range from 4 to 100 acres in size. They are 40 to 60 percent Ava soils and 25 to 40 percent Hickory soils. The Hickory soils are on the lower part of the slope, and the Ava soils are on the upper part of the slope. These soils occupy narrow bands on short slopes. It is not practical to separate these soils in mapping.

Typically, the Ava soil has a surface layer of yellowish brown light silty clay loam about 4 inches thick. The subsoil is about 42 inches thick. The upper part of the subsoil is yellowish brown light silty clay loam with mottles in the lower part. The lower 37 inches is strong brown light silty clay loam with thick, light gray coatings and mottled yellowish brown silty clay loam. Below this is firm and dense, mottled, strong brown silty clay loam grading to strong brown silt loam with depth. The substratum to a depth of about 68 inches is mottled dark brown silt loam. In places that are not severely eroded the surface layer is brown silt loam, and the upper part of the subsoil is thicker.

Typically, the Hickory soil has a surface layer of yellowish brown clay loam about 5 inches thick. The subsoil is about 48 inches thick. It is yellowish brown and strong brown, firm clay loam throughout but has mottles in the middle and lower parts. The substratum to a depth of about 60 inches is mottled pale brown loam. In places not so severely eroded the surface layer is brown silt loam. In some places the surface layer and upper part of the subsoil are silty clay loam.

Included with this unit in mapping are areas where the lower part of the slope consists of a mottled gray soil. Some areas of Bonnie and Belknap soils along the narrow drainageways and a few areas of this Ava-Hickory complex that are steeper are also included. Inclusions make up about 5 to 10 percent of the unit.

Water and air move through the Hickory soil and the upper subsoil of the Ava soil at a moderate rate and move through the lower subsoil of the Ava soil at a very slow rate. Surface runoff from cultivated areas is rapid. Reaction ranges from extremely acid to neutral in the subsoil of the Hickory soil and from extremely acid to strongly acid in the subsoil of the Ava soil. The surface layer is firm and difficult to work into an adequate seedbed. Clods can form if the soils are worked when wet, and the surface crusts or puddles after hard rains. Organic-matter content is very low, and available water capacity is high in the Hickory soil and moderate in the Ava soil.

Most areas of this mapping unit are farmed. These soils have poor to fair potential for cultivated crops, fair to good potential for hay, pasture, and trees, mostly fair potential for recreation uses, fair to good potential for most wildlife uses, and fair to poor potential for most engineering uses.

This mapping unit is suited to corn, soybeans, grain sorghum, and wheat in rotation with grasses and legumes. If these soils are used for cultivated crops, there is a hazard of further erosion damage. Minimum tillage, winter cover crops, and grassed waterways help to control erosion. Returning crop residue or regularly adding other organic material helps to improve fertility, reduce crusting, and increase water intake. A few areas have

slopes that are smooth enough to be farmed on the contour or stripcropped.

These soils are best suited to grasses and legumes for hay and pasture. Sowing grass and legume seeds in a nurse crop of small grain aids in stand establishment. Adding fertilizers is important for establishment and maintenance of grasses and legumes. The vegetative cover can be kept in good condition by proper stocking rates, timely cutting or grazing, and restricted use during wet periods.

This mapping unit is also suited to trees, and some of the included areas remain in native hardwoods. Plant competition is the main problem. It can be controlled by proper site preparation or by spraying or cutting. There are no other problems to be concerned about when growing trees.

These soils are not well suited to use as building sites but can be used if the problems of slope and shrink-swell potential are resolved. Proper design and installation of footings and foundations are needed to prevent structure damage from shrink-swell. This mapping unit provides good water-storage sites, but careful construction of the dam is necessary to increase material strength and stability. Capability subclass IVe; woodland suitability subclass 2o for Ava soil, 1o for Hickory soil.

929D2—Hickory-Ava silt loams, 12 to 18 percent slopes, eroded. This mapping unit consists of strongly sloping, moderately well drained and well drained soils on side slopes along drainageways and hillsides above bottom land soils. Individual areas of this unit are mostly elongated in shape and range from 5 to about 75 acres in size. They are 45 to 70 percent Hickory soils and 25 to 50 percent Ava soils. The Hickory soils are on the lower and mid parts of the slope, and the Ava soils are on the upper part of the slope. These soils occupy narrow bands on short slopes. It is not practical to separate these soils in mapping.

Typically, the Hickory soil has a surface layer of brown silt loam about 6 inches thick. Some yellowish brown subsoil material has been mixed with the surface layer by plowing. The subsoil is about 54 inches thick. It is yellowish brown and strong brown, firm clay loam with mottles in the middle and lower parts. The substratum to a depth of about 65 inches is mottled pale brown loam. In some places not so eroded, the surface layer is dark grayish brown silt loam about 3 inches thick. It overlies a brown silt loam subsurface layer. In other places the upper part of the subsoil is silty clay loam. In some places that are severely eroded, the surface layer is yellowish brown clay loam.

Typically, the Ava soil has a surface layer of brown silt loam about 6 inches thick. Some yellowish brown subsoil material has been mixed with the surface layer by plowing. The subsoil is about 48 inches thick. The upper part is yellowish brown light silty clay loam with mottles in the lower part. The lower 37 inches is strong brown light silty clay loam with light gray coatings over mottled yellowish brown silty clay loam. Below this is firm and dense, mottled, strong brown silty clay loam grading to strong brown silt loam with depth. The substratum to a depth of about 68 inches is mottled dark brown silt loam. In places where this soil is severely eroded, the surface layer is yellowish brown light silty clay loam. In wooded areas a thin, brown or yellowish brown silt loam subsurface layer underlies a dark grayish brown silt loam surface layer.

Included with this unit in mapping are soils in a few areas where bedrock crops out and areas of soils that are severely eroded. Also included are escarpments of mainly Hickory soils, some areas of Bonnie and Belknap soils along the narrow drainageways, and areas of a mottled gray soil at the middle or lower parts of some slopes. Inclusions make up 10 to 15 percent of this mapping unit.

Water and air move through the Hickory soil and the upper subsoil of the Ava soil at a moderate rate and move through the lower subsoil of the Ava soil at a very slow rate. Surface runoff from cultivated areas is rapid. Reaction ranges from extremely acid to neutral in the subsoil of the Hickory soil and from extremely acid to strongly acid in the subsoil of the Ava soil. The surface layer is friable and easy to till. Organic-matter content is low, and available water capacity is high in the Hickory soil and moderate in the Ava soil.

Most areas of this unit are in pasture, and some are farmed. This unit has fair to poor potential for cultivated crops and fair to good potential for hay, pasture, and trees. The potential for most recreation and engineering uses is poor to fair, and for openland and woodland wildlife it is fair to good.

This mapping unit is not well suited to cultivated crops, but corn, soybeans, grain sorghum, and wheat can be grown in a rotation that includes grasses and legumes. The main concern of management if this unit is used for crops is the erosion hazard. Minimum tillage, zero tillage, and winter cover crops help to control erosion. A few areas are suited to contour stripcropping.

These soils are best suited to grasses and legumes for hay and pasture. Grasses and legumes are very effective in controlling erosion if the soils are fertilized. When initially establishing the stand, it is best to sow seed in a small grain crop to restrict erosion. Existing pastures can be renovated by using chemicals to kill undesirable vegetation, by disking lightly, and by sowing seed into the remaining vegetation. Competing vegetation can be kept out by clipping or spraying.

This unit is well suited to trees. The main problem is controlling or removing the competing vegetation. This can be accomplished by site preparation or by spraying, cutting, or girdling. Equipment is somewhat limited by the slopes, and some areas should be hand planted. Adapted species survive and grow well on these soils.

Steep slopes limit this mapping unit for use as building sites. If slopes are altered, foundations and footings should be designed to prevent structure damage caused by differential settling. Capability subclass IVe; woodland suitability subclass 1r for Hickory soil, 2o for Ava soil.

930G—Goss-Alford complex, 25 to 65 percent slopes. This mapping unit consists of steep to very steep, well drained soils on dissected hillsides. Individual areas of this unit are irregular in shape and range from 5 to more than 1,000 acres in size. They are 60 to 80 percent Goss soils and 20 to 40 percent Alford soils. The Goss soils are on the lower and middle parts of side slopes, and the Alford soils are on the upper parts of side slopes and in some coves. The two soils occupy very steep and dissected, heavily wooded terrain that makes separation in mapping impractical.

Typically, the Goss soil has a surface layer of very dark grayish brown and dark grayish brown cherty silt loam about 3 inches thick. The subsurface layer is brown very cherty silt loam in the upper 7 inches and light brown very cherty silt loam in the lower 13 inches. The subsoil is yellowish red and light brown very cherty silty clay in the upper 5 inches. The next 15 inches is red very cherty clay. Below that is 10 inches of red and reddish yellow very cherty clay. The lower part of the subsoil to a depth of about 60 inches is red very cherty clay.

Typically, the Alford soil has a surface layer of very dark grayish brown silt loam about 2 inches thick. The subsurface layer is yellowish brown silt loam about 5 inches thick. The subsoil is about 45 inches thick. It is brown silt loam in the upper 3 inches. The next 20 inches is strong brown light silty clay loam. The lower part is yellowish brown silt loam. The substratum to a depth of 60 inches is yellowish brown silt loam. In some places the subsoil is thinner and contains less clay. Also, in some places the substratum contains free lime.

Included with these soils in mapping are a few areas of Wakeland and Haymond soils along narrow drainageways. Also included on some slopes are areas of cherty limestone outcrops and, on less sloping narrow ridgetops, areas of Alford soils. Inclusions make up about 5 percent of this unit.

Water and air move through the soils of this unit at a moderate rate. Surface runoff is rapid to very rapid. The soils range from medium acid to very strongly acid in the subsoil. Organic-matter content is low. Available water capacity is low in the Goss soil and high in the Alford soil. Root growth is restricted in the very cherty Goss soil.

Most areas of these soils remain in native trees. The soils have poor potential for cultivated crops, hay, and pasture. The potential for most recreation uses is poor, and the potential for woodland wildlife is fair. These soils have poor potential for most engineering uses.

These soils are best suited to trees. The very steep slopes limit the use of these soils. Management problems are equipment limitations and a severe erosion hazard. Trees adequately protect these soils from erosion, but areas that are exposed by logging erode rapidly. Logging trails and roads should be on the contour where possible, and bare areas should be seeded after logging. The very steep slopes hinder the ease of cutting and the removal of trees, but special equipment and safety precautions can overcome these problems.

The very steep slopes make this unit unsuitable for building development. Roads are difficult to build and maintain because of the severe erosion hazard in exposed areas. Capability subclass VIIs; woodland suitability subclass 4f for Goss soil, 1r for Alford soil.

976G—Neotoma-Rock outcrop complex, 25 to 55 percent slopes. This mapping unit consists of steep to very steep, well drained to excessively well drained soils on hillsides and at the head of drainageways. Individual areas of this unit are elongated or rounded in shape and range from 5 to 100 acres in size. They are 60 to 80 percent Neotoma soils and 10 to 20 percent Rock outcrop. The Neotoma soils are on the lower and middle parts of hillsides, and Rock outcrop is on the upper part or in narrow bands at various positions on the hillside. The Neotoma soils and Rock outcrop occur in such an intricate pattern on most hillsides that it is impractical to separate them in mapping.

Typically, the Neotoma soil has a very dark grayish brown stony loam surface layer about 2 inches thick. The subsurface layer is brown cobbly light loam about 18 inches thick. The subsoil is about 28 inches thick. The upper part is yellowish red cobbly loam. The next layer is yellowish red cobbly clay loam. The lower part is yellowish red stony light clay loam. The substratum to a depth of about 60 inches is mixed red, yellowish red, and strong brown sandy clay loam. In some places bedrock is more shallow than 40 inches. In other places the subsoil is thicker, and bedrock is deeper than 80 inches. In some places the subsoil, particularly the lower part, lacks the high content of coarse fragments.

Rock outcrop areas consist largely of bedrock escarpments, ledges, and outcrops. Bedrock is shale, siltstone, sandstone, or limestone, but it is dominantly sandstone. Some stony loam areas, less than 40 inches deep over bedrock, are interspersed with the outcrops, ledges, and escarpments.

Included in mapping are areas of Wellston and Burnside soils. Wellston soils are above the highest escarpment or on hillside ridges below the escarpment. Burnside soils are along bottoms of streams that dissect areas of these soils. Inclusions make up about 5 to 10 percent of this unit.

Water and air move through the soil material at a moderate to moderately rapid rate. Surface runoff is rapid to very rapid. Reaction ranges from extremely acid to strongly acid. Organic-matter content is low, and available water capacity is moderate in the Neotoma soil and low to very low in Rock outcrop areas. Surface stones, cobbles, and boulders restrict tree density.

Most areas of this mapping unit remain in native hardwoods. This unit has poor potential for cultivated crops, hay, and pasture and poor to fair potential for trees. The potential for recreation and engineering uses is poor, and the potential for woodland wildlife is fair.

This mapping unit is best suited to trees. Equipment limitations and the erosion hazard are the management problems. The very steep slopes, surface stoniness, and

the bands of bedrock escarpments seriously restrict the use of planting and harvesting equipment. Winches help to remove logs from most slopes, but some areas have limited accessibility. Logging roads and trails should be on the contour when possible to help reduce erosion. Bare areas should be seeded with grasses and legumes to prevent excess erosion.

Building sites and roads are not well suited to this unit because of very steep slopes and excessive stoniness. Capability subclass VIIs; woodland suitability subclass 1r for Neotoma soil, Rock outcrop not assigned to a woodland suitability subclass.

977E—Neotoma-Wellston complex, 18 to 30 percent slopes. This mapping unit consists of moderately steep and steep, well drained soils on hillsides and along drainageways. Individual areas of this unit are elongated or somewhat rounded in shape and range from 6 to 75 acres in size. They are 30 to 55 percent Neotoma soils and 25 to 45 percent Wellston soils. The Wellston soils are on the upper parts of hillsides in some areas, on the lower parts in others, and on convex ridges on hillsides dissected by drainageways. The Neotoma soils are on the lower part of hillsides, along the drainageways, and in areas adjacent to rock outcrops or bedrock escarpments. These two soils occupy steep, heavily wooded terrain that makes accurate separation in mapping impractical.

Typically, the Neotoma soil has a very dark grayish brown stony loam surface layer about 2 inches thick. The subsurface layer is brown cobbly light loam about 18 inches thick. The subsoil is about 28 inches thick. The upper part is yellowish red cobbly loam. The next layer is yellowish red cobbly clay loam. The lower part is yellowish red stony light clay loam. The substratum to a depth of about 60 inches is mixed red, yellowish red, and strong brown sandy clay loam. In some places bedrock is more shallow than 40 inches. In other places the subsoil is thicker, and bedrock is deeper than 80 inches.

Typically, the Wellston soil has a dark grayish brown silt loam surface layer about 1 inch thick. The subsurface layer is 5 inches of yellowish brown silt loam. The subsoil is about 44 inches thick. The upper part is strong brown heavy silt loam grading to silty clay loam. The lower part, in residuum, is strong brown heavy silt loam grading to heavy loam. Fractured sandstone and siltstone bedrock is at a depth of 50 inches. In some places there are coarse fragments throughout the profile. In other places bedrock is deeper than 72 inches.

Included with these soils in mapping are areas of bedrock outcrops, ledges, and escarpments. Also included are some areas of Alford, Hickory, and Burnside soils. Alford soils are on the upper part of some hillsides or on ridges on the hillside where slopes are complex. Hickory soils are at the base of the hillside, and Burnside soils are along the bottoms of small streams. Inclusions make up about 15 percent of this unit.

Water and air move through the Wellston soil at a moderate rate and through the Neotoma soil at a moderate to moderately rapid rate. Surface runoff is rapid. Reaction ranges from extremely acid to strongly acid in the subsoil of these soils. Organic-matter content is low, and available water capacity is high in the Wellston soil and moderate in the Neotoma soil. Boulders and cobbles restrict tree density and root growth on the Neotoma soil.

Most areas of this unit are in native hardwoods. These soils have poor potential for cultivated crops and hay, poor to fair potential for pasture, and fair potential for trees. The potential for recreation use is mostly poor, and for woodland and openland wildlife use it is fair to good. These soils have poor potential for most engineering uses.

These soils are best suited to trees. Equipment limitations and the erosion hazard are the management problems. The steep slopes, bedrock outcrops and escarpments, and surface stoniness all limit the use of equipment, planting, and harvesting on this unit, particularly in the areas of Neotoma soil. If the surface is exposed during logging operations, the Wellston soil is more subject to erosion than the Neotoma soil and roads and trails should be smoothed, fertilized, and seeded to protect these areas.

This mapping unit is not well suited to building sites or onsite waste disposal because of steep slopes and depth to bedrock. Roads are difficult to build and maintain because of bedrock outcrops, ledges and escarpments, and the erosion hazard. Capability subclass VIIs for Neotoma soil, VIe for Wellston soil; woodland suitability subclass 1r for Neotoma soil, 2r for Wellston soil.

977G—Neotoma-Wellston complex, 30 to 50 percent slopes. This mapping unit consists of very steep, well drained soils on hillsides and along drainageways. Individual areas of this unit are elongated or rounded in shape and range from 5 to 600 acres in size. They are 40 to 60 percent Neotoma soils and 20 to 40 percent Wellston soils. The Wellston soils are on the upper parts of hillsides in some areas, on the lower parts in others, and on convex ridges on hillsides dissected by drainageways. The Neotoma soils are at the head of drainageways, along drainageways, or in areas adjacent to rock outcrops or bedrock escarpments. These two soils occupy very steep, heavily wooded terrain that makes accurate separation in mapping impractical.

Typically, the Neotoma soil has a very dark grayish brown stony loam surface layer about 2 inches thick. The subsurface layer is brown cobbly light loam about 18 inches thick. The subsoil is about 28 inches thick. The upper part is yellowish red cobbly loam. The next layer is yellowish red cobbly clay loam. The lower part is yellowish red stony light clay loam. The substratum to a depth of about 60 inches is mixed red, yellowish red, and strong brown sandy clay loam. In some places bedrock is more shallow than 40 inches. In other places the subsoil is thicker, and bedrock is deeper than 80 inches.

Typically, the Wellston soil has a dark grayish brown silt loam surface layer about 1 inch thick. The subsurface layer is 5 inches of yellowish brown silt loam. The subsoil is about 44 inches thick. The upper part is strong brown

heavy silt loam grading to silty clay loam. The lower part is strong brown heavy silt loam grading to heavy loam. Fractured sandstone and siltstone bedrock is at a depth of about 50 inches. In some places there are coarse fragments throughout the profile. In other places bedrock is deeper than 72 inches.

Included with these soils in mapping are areas of bedrock outcrops, ledges, and escarpments. Also included are areas of Alford, Hickory, and Burnside soils. Alford soils are on the upper part of some hillsides or on ridges on the hillside where slopes are complex. Hickory soils are at the base of the hillside, and Burnside soils are along the bottoms of small streams. Inclusions make up about 5 to 10 percent of this unit.

Water and air move through the Wellston soil at a moderate rate and through the Neotoma soil at a moderate to moderately rapid rate. Surface runoff is very rapid. Reaction ranges from extremely acid to strongly acid in the subsoil. Organic-matter content is low. Available water capacity is high in the Wellston soil and moderate in the Neotoma soil. Boulders, cobbles, outcrops, and escarpments restrict tree density and root growth on the Neotoma soil.

Most areas of this unit are in native hardwoods. These soils have poor potential for cultivated crops, hay, and pasture and fair potential for trees. The potential for recreation and engineering uses is poor, and the potential for woodland wildlife is good.

These soils are best suited to trees. The very steep slopes, bedrock outcrops and escarpments, and surface stoniness all limit the use of equipment on this unit, particularly in the areas of Neotoma soils. There is also an erosion hazard if the surface is exposed during logging operations. Logging roads and trails should be smoothed, fertilized, and seeded to protect these areas from erosion.

These soils are not suitable for building sites because they are very steep and are somewhat shallow over bedrock. Roads are difficult to build and maintain because of the erosion hazard and the bedrock outcrops, ledges, and escarpments. Roads should be built on the contour when possible. Capability subclass VIIs for Neotoma soil, VIIe for Wellston soil; woodland suitability subclass 1r for Neotoma soil, 2r for Wellston soil.

999D—Alford-Hickory silt loams, 12 to 18 percent slopes. This strongly sloping, moderately well drained or well drained mapping unit is on side slopes along drainageways or on hillsides above bottom lands. Individual areas of this unit range from 5 to about 100 acres in size. They are 50 to 70 percent Alford soils and 20 to 40 percent Hickory soils. The Hickory soils are on the lower part of the slope, and the Alford soils are on the upper part. These two soils occupy long, narrow bands. To map the soils separately would not be practical.

Typically, the Alford soil has a surface layer of dark grayish brown silt loam about 4 inches thick and a subsurface layer of brown silt loam about 6 to 8 inches thick. The subsoil is about 60 inches thick. It is strong brown, firm silty clay loam grading to silt loam in the lower part. The substratum is brown, friable silt loam. In places that have been cultivated, the surface and subsurface layers have been mixed and are brown silt loam about 5 to 8 inches thick.

Typically, the Hickory soil has a surface layer of dark grayish brown silt loam about 3 inches thick and a subsurface layer of brown silt loam about 6 inches thick. The subsoil is about 55 inches thick. It is yellowish brown and strong brown, firm clay loam with mottles in the lower part. The substratum to a depth of about 70 inches is pale brown loam. In places that have been cultivated, the surface and subsurface layers have been mixed and are brown silt loam about 6 inches thick.

Included with these soils in mapping are small severely eroded areas and bedrock escarpments. Also included are areas of these soils having slopes steeper than 18 percent. Inclusions make up about 5 percent of this unit.

Water and air move through these soils at a moderate rate, and surface runoff is rapid. Organic-matter content is low. The surface layer is friable and easily tilled but tends to crust after hard rains. Available water capacity is high.

Most areas of these soils remain in trees or are used for pasture. A few areas are planted to small grains or hay, and others are in orchards. The soils have poor to good potential for these uses, poor to good potential for most recreational uses, good potential for woodland use, and poor to fair potential for most engineering uses.

This unit is suitable for occasional cropping of small grains or for hay. The hazard of water erosion is high. Farming on the contour helps slow down runoff water and reduces erosion. Hayland must be managed to maintain vegetative cover. Adding necessary fertilizers, spraying, and timely cutting help to maintain a protective cover.

This unit is best suited to pasture. The major problem is controlling erosion during establishment or renovation. These soils should be tilled and seeded on the contour. Fertilizer should be added according to tests. The soils should be seeded at the optimum time and protected from grazing until established. Proper stocking rates and a planned grazing system help keep the pasture in good condition. Clipping or spraying keeps out undesirable brush and weeds.

This unit is well suited to trees. Controlling plant competition is the major problem for management. This can be accomplished by proper site preparation, spraying, cutting, or girdling. Erosion control during establishment of the trees is important, and it can be accomplished by minimum tillage, by planting on the contour, and by strip planting.

This unit is well suited to certain specialty crops, particularly apples and certain small fruits. Controlling water erosion and conserving water for maximum growth are management problems. Terracing is effective in controlling erosion and in conserving water.

This unit is not well suited to use as building sites because of moderately steep slopes and the erosion

hazard. Water reservoir sites are plentiful, particularly where Hickory soil makes up 40 percent of the area. Seepage may occur in the substratum of the Alford soil. Capability subclass IVe; woodland suitability subclass 1o for Alford soil, 1r for Hickory soil.

999D3—Alford-Hickory complex, 12 to 18 percent slopes, severely eroded. This strongly sloping, moderately well drained or well drained mapping unit is on side slopes along drainageways or on hillsides above bottom lands. Individual areas are elongated or irregular in shape and range from 5 to about 150 acres in size. They are 50 to 70 percent Alford soils and 25 to 40 percent Hickory soils. The Hickory soils are on the lower part of the slopes, and the Alford soils are on the mid and upper parts of the slopes. These two soils occur as winding, narrow bands. It is not practical to map these soils separately.

Typically, the Alford soil has a surface layer of strong brown silty clay loam about 4 inches thick. The subsoil is about 50 inches thick. The upper part is strong brown silty clay loam, the middle part is brown silty clay loam, and the lower part is brown heavy silt loam. The substratum to a depth of about 60 inches is brown silt loam. The surface layer is silt loam where it has not been entirely eroded away.

Typically, the Hickory soil has a yellowish brown clay loam surface layer about 4 inches thick. The subsoil is about 45 inches thick. It is yellowish brown and strong brown, firm clay loam throughout and has mottles in the lower part. The substratum to a depth of about 60 inches is pale brown loam. In places the surface layer is silty clay loam.

Included with these soils in mapping are areas of Hickory soils on short, steep slopes and escarpments, areas where bedrock crops out, and a few areas of bedrock escarpments. Also included are areas of these soils having slopes steeper than 18 percent; a few areas of soils that are so severely gullied and eroded that most or all of the subsoil has been removed; and a sticky, gray clayey soil that occurs as bands on some slopes. Inclusions make up 5 to 10 percent of this unit.

Water and air move through these soils at a moderate rate, and surface runoff from cultivated areas is rapid to very rapid. Reaction ranges from extremely acid to neutral in the Hickory soil and from very strongly acid to medium acid in the Alford soil. The surface layer is firm, slow to dry, and somewhat difficult to till. Clods can form if these soils are worked when wet. These soils tend to crust or seal over after hard rains because of poor structure, increased clay content, and very low organic-matter content. Available water capacity is high.

Most areas of these soils are farmed or pastured. These soils have poor to fair potential for cultivated crops and fair to good potential for hay, pasture, and trees. The potential for recreation is fair to poor, the potential for openland wildlife uses is fair to good, and the potential for most engineering uses is poor to fair.

These soils are best suited to grasses and legumes for hay and pasture. Row crops are poorly suited to these soils because of the steepness of slopes and the erosion hazard. Extreme caution must be used along with minimum tillage or zero tillage to control erosion if this unit is used for cultivated crops.

Legumes and grasses are very effective in controlling erosion if these soils are properly fertilized. Initial establishment is difficult and risky because of poor tilth and the erosion hazard. Sowing grasses and legumes in a cover crop of wheat initially establishes the stand. An area in pasture or hay can be renovated by using chemicals to control unwanted vegetation and by sowing directly into the remaining vegetation. The pasture can be maintained by preventing overgrazing and by restricting use during wet periods.

Most idle land areas of this unit are revegetated with native plants, which adequately protect the surface from excessive erosion. These areas are well suited to a wide variety of openland wildlife. Some severely gullied areas, however, require land shaping, fertilizing, and planting to become stabilized and useful.

This unit is well suited to trees if plant competition is controlled. Competing vegetation can be controlled or removed by proper site preparation or by spraying or cutting.

This mapping unit is not well suited to use as building sites or for onsite waste disposal systems because of slopes. After some reshaping of slopes, however, structures can be built on these soils. Capability subclass VIe; woodland suitability subclass 1o for Alford soil, 1r for Hickory soil.

999E—Hickory-Alford silt loams, 18 to 30 percent slopes. This moderately steep to steep mapping unit consists of moderately well drained and well drained soils on hillsides. Individual areas of this unit are elongated in shape and range from 4 to about 300 acres in size. They are 50 to 60 percent Hickory soils and 20 to 40 percent Alford soils. The Hickory soils are on the mid and lower parts of the slope, and the Alford soils are on the upper part of the slope. These two soils occupy long, narrow bands. It is not practical to separate these soils in mapping.

Typically, the Hickory soil has a dark grayish brown silt loam surface layer about 2 inches thick and a brown silt loam subsurface layer about 3 inches thick. The subsoil is about 51 inches thick. It is yellowish brown, strong brown, and pale brown, firm clay loam throughout and has mottles in the lower part. The substratum to a depth of about 62 inches is pale brown loam. In some places the subsoil is thicker.

Typically, the Alford soil has a dark grayish brown silt loam surface layer about 3 inches thick and a yellowish brown silt loam subsurface layer about 7 inches thick. The subsoil is about 50 inches thick. The upper part is strong brown silty clay loam, the middle part is brown light silty clay loam, and the lower part is brown heavy silt loam. In some places the subsoil contains less clay and is heavy silt loam throughout.

Included with these soils in mapping are a few limestone sinkholes and areas of short, steep slopes and escarpments along bottom lands. Also included are severely eroded soils, primarily in the areas of Alford soil; bedrock outcrops and bedrock escarpments, primarily in the areas of Hickory soil; some spur ridges of Alford soils at the head of some drainageways; and some areas of Wellston soils. Inclusions make up 5 to 10 percent of this unit.

Water and air move through these soils at a moderate rate, and surface runoff is rapid. Reaction in the subsoil ranges from extremely acid to neutral in the Hickory soil and from very strongly acid to medium acid in the Alford soil. Organic-matter content is low, and available water capacity is high.

Most areas of these soils are in native hardwoods. These soils have poor potential for cultivated crops and hay and fair to good potential for pasture and trees. The potential for openland and woodland wildlife is fair to good, and the potential for most engineering uses is poor.

This mapping unit is suited to grasses and legumes for pasture where trees have been cleared. Some less sloping parts of this unit can be used for hay. Grasses and legumes grow well and are effective in controlling erosion once the stand becomes established. Fertilizers are needed to promote good growth. Steep slopes limit machinery use and make site preparation, cutting or clipping, and harvesting difficult. Grazing should be closely watched, and pastures should be rotated to keep the pasture and soil in good condition.

This mapping unit is best suited to trees. Management problems are controlling plant competition, controlling erosion, and equipment limitations. Competing vegetation can be controlled by proper site preparation or by spraying, cutting, or girdling. Planting trees in a low-growing cover crop helps to control erosion. Once established, trees adequately protect this soil from excessive erosion. Areas exposed in logging operations, such as trails and roads, should be seeded with a cover crop. Mechanical planting should be on the contour where practical. Use of logging equipment is somewhat limited by steep slopes.

This soil is not well suited to building site development or onsite waste disposal systems because of steep slopes. Roads are difficult to maintain because of the erosion hazard along roadbanks and ditches. Laying roads out on the contour as much as is practical helps to control erosion. Capability subclass VIe; woodland suitability subclass 1r.

999E3—Hickory-Alford complex, 18 to 30 percent slopes, severely eroded. This moderately steep to steep, moderately well drained and well drained mapping unit is on side slopes along drainageways and on hillsides above bottom land soils. Individual areas are elongated or irregular in shape and range from 5 to about 100 acres in size. They are 50 to 65 percent Hickory soils and 20 to 35 percent Alford soils. The Hickory soils are on the mid and lower parts of side slopes, and the Alford soils are on the upper part of the side slopes. These two soils occur as long, narrow bands. It was not practical to separate these soils in mapping.

Typically, the Hickory soil has a dark yellowish brown clay loam surface layer about 2 inches thick. The subsoil is about 45 inches thick. It is yellowish brown and strong brown, firm clay loam throughout and has mottles in the lower part. The substratum to a depth of about 60 inches is pale brown loam.

Typically, the Alford soil has a dark brown silty clay loam surface layer about 2 inches thick. The subsoil is about 40 inches thick. The upper part is strong brown silty clay loam, the middle part is brown silty clay loam, and the lower part is brown heavy silt loam. The substratum to a depth of 60 inches is brown silt loam. In some places the subsoil is thinner and is brown silt loam throughout.

Included with this unit in mapping are a few areas of bedrock outcrops, a few areas of escarpments above bottom lands, and some narrow spur ridges of less steep Alford soils on hillsides. Also included are soils that are so severely gullied and eroded that most or all of the subsoil has been removed. In a few places a sticky, gray clayey soil occurs as bands on slopes. A few areas of silty alluvial soils are included along the narrow drainageways. Inclusions make up 5 to 15 percent of this unit.

Water and air move through these soils at a moderate rate, and surface runoff is very rapid. Reaction in the subsoil ranges from extremely acid to neutral in the Hickory soil and from very strongly acid to medium acid in the Alford soil. Organic-matter content is very low, and available water capacity is high.

Most areas of this unit are in pasture or remain as brushy, idle land. These soils have poor potential for cultivated crops and hay and fair to good potential for pasture and trees. They have fair to good potential for openland wildlife and poor potential for most recreation and engineering uses.

This mapping unit is not suited to cultivated crops because of the erosion hazard and equipment limitations on steep slopes. Hay can be grown in the less sloping areas of this unit where equipment can be safely used. Fertilizers are required to obtain good growth of grasses and legumes.

This mapping unit is suited to pasture, but establishment of grasses and legumes on these severely eroded soils is difficult. Fertilizers, in particular lime and nitrogen, are needed to improve the stand and maintain growth. Preparation for seeding is not easy because of the poor tilth and workability of these soils. This unit should not be clean tilled when it is seeded or reseeded because bare areas erode rapidly. Instead, chemicals should be used to control unwanted vegetation and seeding should be directly into existing organic materials. Once the grasses or legumes are established, overgrazing or grazing when the soil is too wet should be avoided.

Some idle areas of this unit are revegetated with native plants, and they supply some food and cover for openland wildlife. Many of these areas, particularly the areas of Al-

ford soil, are adequately protected from erosion. Some severely gullied areas, however, require land shaping, fertilizing, and planting to become stabilized and useful. These areas are usually small and irregularly shaped and are best suited to wildlife.

This unit is suited to trees. Plant competition, the erosion hazard, and equipment limitations are problems that management must overcome if this unit is used for woodland. Proper site preparation and spraying or cutting help control competing vegetation. Erosion can be controlled by planting adapted trees and applying good management when harvesting. Because of steep slopes, the use of planting equipment is somewhat restricted and hand planting is necessary on the steeper parts of this unit. Also, in some areas logging operations should be delayed during wet periods to prevent damage to the steep slopes.

These soils are not suited to use as building sites or for onsite waste disposal systems because of steep slopes and the erosion hazard. Some reshaping of the slopes is necessary if the soils are used as building sites. Erosion on bare areas of these soils is severe and very severe, and these areas are somewhat difficult to vegetate. Proper shaping, fertilizing, seeding, and mulching are required to revegetate bare areas. Capability subclass VIe; woodland suitability subclass 1r.

M.D.—Mine Dump. This nearly level to very steep mapping unit is the result of strip mining and deep shaft mining for coal. Individual areas of this unit are mostly irregular in shape and range from 2 to about 100 acres in size.

Typically, this unit consists of unconsolidated fragments of shale and coal that have been separated from coal lumps. The fragments generally are extremely acid, and the areas are devoid of vegetation.

Included with this unit in mapping are small areas that contain water and a few areas of Bluford and Wynoose soils that have not been stripped or buried under the mined materials. In some steep mined areas, Orthents, loamy, are also included.

This mapping unit has poor potential for most uses. The extreme acidity, irregular topography, and stony, clayey materials restrict suitability.

Some special recreation uses, such as motorcycle trails or tracks and shooting ranges, are possible. The main problems are excessive stoniness and steep slopes. These can be overcome with a minimum of expense.

Some special crops, such as blueberries, will grow on these materials if sufficient water is available.

Qu.—Quarry. This nearly level to very steep mapping unit occurs as areas from which limestone bedrock is extracted for commercial uses. Individual areas are irregular in shape and range to about 75 acres in size.

Typically, this unit consists of limestone bedrock exposed through quarrying. The unconsolidated material has been removed and the limestone mined, leaving a depression with a nearly level bottom and nearly perpendicular sidewalls. Piles of various sizes of crushed limestone are within the area.

Included with this unit in mapping are small areas where the overburden soil material has not been removed. These soils are similar to adjoining soils.

This unit has poor potential for most uses. Because there is little or no unconsolidated material, this unit is largely devoid of vegetation.

Special recreation facilities, such as a shooting range could be developed easily. Some areas could be developed as water recreation areas.

Use and Management of the Soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic systems, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of soils for crops and pasture, rangeland, and woodland, and as sites for buildings, highways and other transportation systems, sanitary facilities, parks and other recreation facilities, and wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Crops and Pasture

Paul W. Ice, district conservationist, Soil Conservation Service, assisted in preparing this section.

The use and management of soils for the production of grain crops, specialty crops, hay, and pasture is covered in this section. The capability classification of soils used by the U.S. Department of Agriculture, Soil Conservation Service, is explained. The estimated yield of the principal crops for each soil is listed in table 5. This section also provides information on land use problems, trends, and the potential of soils for an increased production of crops.

This resource information is especially valuable to those in the agri-business sector, such as farmers, equipment dealers, drainage contractors, fertilizer companies, processing companies, land use planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Soil Maps for Detailed Planning." Planners of management systems for individual fields or farms should also consider the detailed information given in the description of each soil.

According to the Illinois Soil and Water Conservation Needs Inventory, more than 207,000 acres was used for grain crops, orchards, hay, and pasture in 1970 (*9*). Of this total, 74,000 acres was used for row crops, 20,000 acres for small grain (mainly wheat), 5,000 acres for rotation hay and pasture, 10,000 acres as permanent hayland, and 55,000 acres as permanent pasture. The remaining cropland in the inventory included 22,000 acres for conservation use only, 18,000 acres of open land or idle cropland, and 3,300 acres used for orchards.

Jackson County soils have good potential for increased crop production. About 41,000 acres of potentially good cropland is currently being used as woodland. About 32,000 acres now in pasture and 26,000 acres of idle land could be converted to cropland if proper land use systems were used.

In addition to the reserve productive capacity represented by this land, food production could be increased by extending the latest crop production technology to all cropland in the county. This soil survey can greatly facilitate the application of such technology.

Urban expansion, strip development, subdivisions, highways, airport expansion, numerous country homes, strip mining for coal, and water resource development (Kinkaid and Cedar Lakes) have encroached on farmland. In 1967 there were an estimated 12,500 acres of urban and built-up land in Jackson County. In 1974 there were about 28,000 acres of urban and built-up land, which indicates an annual growth rate of about 2,000 acres per year. Land use planners should be encouraged to use the information in this soil survey report to help make land use decisions that will assure the orderly growth and development of urban and rural areas.

Soil erosion is the major problem on about two-thirds of the cropland and pastureland in Jackson County. Erosion is a hazard on slopes of more than 2 percent.

Sheet erosion, or loss of the topsoil, is damaging for three reasons. First, the productivity of the soil is reduced as the topsoil is eroded and the subsoil is incorporated into the plow layer. Loss of topsoil is especially damaging on Alford, Camden, Colp, and Hickory soils or soils with layers in the subsoil that limit the depth of the root zone. Such layers include the fragipans, for example, in Ava and Hosmer soils. Erosion also reduces productivity on soils that tend to be droughty, such as Alvin and Ware soils.

Second, severe erosion on sloping land reduces the tilth and the intake of water. Clayey surfaces tend to be cloddy if worked when wet, and they make a good seedbed difficult to prepare. These soils tend to crust over after hard rains, and runoff is increased.

Third, sediment from uncontrolled soil erosion enters streams, lakes, rivers, and road ditches. Cleaning out or removing this sediment is expensive. Management practices or systems that control erosion reduce sediment pollution of water resources and improve the quality of water for municipal use, recreation, and fish and wildlife.

Soils need management practices or systems that will maintain or improve their natural fertility, remove excess water, protect them from erosion, and keep them in good tilth. Controlling water and wind erosion requires conservation practices that reduce the length of slope or provide adequate vegetation cover on the soil surface. These practices increase water intake and reduce water runoff. Cropping systems that keep vegetative cover and crop residue on the soil surface during critical rainfall periods will hold soil erosion within tolerable limits and help maintain the productive capacity of the soil. Systems that include grasses and legumes in the crop rotation will improve tilth and provide nitrogen for the following crop.

Contour farming, contour stripcropping, terraces, and diversions control erosion and reduce water runoff. Because of the short slopes and irregular topography, these practices are not feasible in most areas of Bluford, Ava, Colp, Alfin, Stoy, and Hurst soils. They are suitable on soils with smooth, uniform slopes. In the upland and terrace areas, they are suitable on some of the Alford, Hosmer, Camden, and St. Charles soils. Some areas of Medway, Ware, Bowdre, and Cairo soils on the Mississippi River flood plain are suitable for contouring or contour stripcropping. Because these practices are not widely adapted for use in Jackson County, minimum tillage systems or cropping rotations that provide adequate vegetation cover can be used to control erosion on these soils.

Zero tillage or minimum tillage helps prevent erosion, reduces water runoff, and increases intake of water. These practices are successful on most of the tillable soils in the county but are less successful on severely eroded soils or on soils that have a clayey surface layer, such as Darwin, Jacob, Karnak, Booker, Cairo, and Bowdre soils.

Wind erosion is a hazard in some areas of the Alvin and Ware soils. This problem can be reduced by maintaining vegetative cover, leaving crop residue on the surface in

winter, or leaving the surface soil rough. Windbreaks of adapted trees or shrubs are also effective in controlling wind erosion.

Soil drainage is needed on about a third of the acreage that is used for crops and pasture in the county. Some soils are so wet that the production of crops common to the area is generally not possible unless the soils are drained. These are the poorly and very poorly drained Darwin, Kacob, Karnak, Booker, Cairo, Piopolis, and Bonnie soils on bottom lands and Okaw, Sexton, Wynoose, and Weir soils on terraces and uplands.

The somewhat poorly drained soils are so wet that crop growth and yields are reduced during many years unless the soils are artificially drained. Examples are Hoyleton, Bluford, Stoy, Hurst, Starks, and Coffeen soils on uplands and terraces and Dupo, Wakeland, Belknap, Medway, Bowdre, and Banlic soils on bottom lands.

Colp and St. Charles soils have good natural drainage most of the year, but they tend to dry out slowly after heavy rains. Ava, Hickory, and Hosmer soils often have seep spots on hillsides or, especially in wet years, along lateral drainageways. Some of these spots are "sodium slicks" that are very difficult to drain or improve. Seep spots are most common on the Hickory soils. Small areas of wetter soils along drainageways and in swales are common inclusions in areas of the moderately well drained Ava, Colp, Howmer, and St. Charles soils. Artificial drainage is needed in some of these areas.

The design of surface and subsurface drainage systems varies with the kind of soil. A combination of surface drainage and tile drainage is needed in most areas of the poorly and very poorly drained soils used for intensive row cropping.

Tile drains do not function well in many soils of the county unless drains are closely spaced. Soils with moderate and moderately slow permeability, such as Belknap, Birds, Coffeen, Gorham, Medway, and Wakeland soils, can be adequately drained with tile if an outlet is available. Tile drainage is not effective in slowly and very slowly permeable soils, such as Booker, Cairo, Darwin, Jacob, Weir, Wynoose, and Okaw soils, unless the tiles are closely spaced.

Surface drainage methods, such as deep and shallow ditching and land leveling, are commonly used to drain excess water from most of the wet soils of Jackson County (fig. 11). These methods are effective if the major rivers and streams are not flooded. Additional care must be taken to insure that ditches are protected from silt deposition and bank erosion by the runoff water.

Soil droughtiness is a problem that limits yields on some of the soils used for crops and pasture in the county. The physical composition of some soils, such as Ware and Burnside soils, has made them so porous that they are unable to store the water necessary to maintain adequate growth of plants. Other soils, such as Ava, Banlic, and Hosmer soils, contain layers or zones that plant roots cannot easily penetrate. These soils dry out quickly, and a moisture stress is soon evident during hot, windy days. Many of the wet clayey soils have similar limitations. The Booker and Jacob soils hold large amounts of water, but little water is readily available to plant roots. Most water is tightly held in a film surrounding clay particles.

Droughtiness can be minimized by increasing water intake, reducing runoff, or planting crops that are drought tolerant. Some of the more commonly used methods for increasing water intake and reducing runoff include minimum or zero tillage, returning crop residue to the soil, and planting cover crops.

Crops such as soybeans and grain sorghum are more tolerant than corn to a reduced water supply, and they are less risky to plant on droughty soils in most years. Winter wheat is better adapted because it matures in the spring before the summer drought reduces the water supply.

Soil fertility is naturally low in most soils of the uplands in the county. All of these soils are naturally acid. The soils on terraces, such as Colp, Hurst, Camden, Starks, and Alvin soils, are also acid. Soils on flood plains are more variable. Jacob, Booker, Piopolis, Bonnie, and Belknap soils are extremely acid to strongly acid; however, Haymond, Wakeland, Cairo, Medway, Darwin, and Gorham soils are slightly acid to neutral.

On most acid soils, limestone should be applied to maintain or raise the pH level for optimum plant growth.

Most of the soils in the county are naturally low in nitrogen, except for those soils having a dark colored surface layer, such as Darwin, Cairo, and Medway soils. Some crops, particularly corn and wheat, respond well to nitrogen fertilizer. Planting legumes, which take nitrogen from the air and fix it in the soil, and adding livestock wastes help to replenish the soil's nitrogen supply.

The dark colored soils on the Mississippi River flood plain are generally medium to high in available phosphorus and potassium. Most of the upland and terrace soils have a low phosphorus and potassium supplying capacity. The terrace soils have mostly low to medium supplying capacity.

Additions of lime, nitrogen, phosphorus, potassium, or any other elements needed for optimum yields should be based on the results of soil tests. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime to apply after tests are made.

Soil tilth is an important factor in the germination of seeds, in the amount of runoff, and in the intake of water into the soil. Soils with good tilth are granular and porous.

Most of the soils used for crops in the county have a silt loam surface layer that is light in color and low in organic-matter content. Generally, the structure of these soils is weak, and intense rainfall causes a crust to form on the surface. This crust is hard when it dries and is nearly impervious to water. Once the crust forms, it reduces water intake and increases runoff. Growing grass crops and regularly adding crop residue, manure, and

other organic material can help improve soil structure and reduce crust formation.

Fall plowing is generally not a good practice on the county's light colored soils that have a silt loam surface layer because of the crust that forms during the winter and spring. Many of these soils are nearly as compact and hard at planting time after fall plowing as they were before they were plowed. Also, many of these soils are on sloping topography and are subject to erosion if they are plowed in the fall.

The dark colored Cairo, Darwin, and Booker soils and the light colored Jacob soils are clayey, and tilth is a problem because these soils often stay wet until late in spring. If these soils are wet when plowed, they tend to be very cloddy, and good seedbeds are difficult to prepare. Fall plowing is needed on these nearly level soils, and it results in good tilth in the spring.

Field crops that are suited to the soils and climate of the survey area include many that are not now commonly grown. Soybeans and corn are the main crops. The acreage in grain sorghum is increasing. Sweet potatoes, white potatoes, green beans, and navy beans can be planted if economic conditions are favorable.

Wheat is the main close-growing crop. Oats, rye, and barley are occasionally grown. Rice can be grown on the clayey Mississippi River bottom land soils but requires high inputs for production. Sunflowers, pumpkins, and squash are grown on various soils on the Mississippi River flood plain (fig. 12), but the acreage and yields are variable.

Jackson County ranks second in the State in the production of apples and peaches. The climatic conditions and the soils are particularly well suited to expanding the apple crop. Some strawberries and tomatoes are also commercially grown.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. Absence of an estimated yield indicates that the soil is not suited to the crop or the crop is not commonly grown on the soil.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered *(10)*.

The yields were estimated assuming that the latest soil and crop management practices were used. Hay and pasture yields were estimated for the most productive varieties of grasses and legumes suited to the climate and the soil. A few farmers may be obtaining average yields higher than those shown in table 5.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residues, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown; that good quality irrigation water is uniformly applied in proper amounts as needed; and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of the soils for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not included because the acreage of these crops is small. The local offices of the Soil Conservation Service and the Cooperative Extension Service can provide information about the management concerns and productivity of the soils for these crops.

Capability Classes and Subclasses

Capability classes and subclasses show, in a general way, the suitability of soils for most kinds of field crops. The soils are classed according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops that require special management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forest trees, or for engineering purposes.

The soils in Jackson County have been placed into capability classes and subclasses. These levels are defined in the following paragraphs.

CAPABILITY CLASSES, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use.

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and landforms have limitations that nearly preclude their use for commercial crop production.

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

Woodland Management and Productivity

BRUCE CURRIE, soil scientist, Soil Conservation Service, assisted in preparing this section.

This section describes the past and present woodland in Jackson County. Most of the information useful to woodland owners, or forest managers, or those planning the use of soils for wood crops is in table 6.

Hardwood forest originally covered almost all of Jackson County, except for large areas of the Mississippi River bottoms. According to the Conservation Needs Inventory (*9*), about 113,000 acres of woodland was privately owned in Jackson County in 1967. In addition, much of the more than 40,000 acres of public land in the Shawnee National Forest is wooded.

Because most of the trees were cleared from soils suitable for cultivated crops, much of the remaining woodland is on soils that are not suited to cultivation. These areas often are too steep, too wet, too stony, or too remote for farming to be profitable. The soils of these areas have fair to good potential to produce trees of high quality if the best suited species are selected and the woodland is properly managed.

The largest areas of woodland occur in soil associations 1, 3, 7, 8, and 9 (see the section "General Soil Map for Broad Land Use Planning"). The most common desirable trees on uplands are white oak, red oak, black oak, hickory, black walnut, and yellow-poplar. The main species that grow on the bottom lands are cottonwood, sycamore, sweetgum, pin oak, and pecan.

According to the Conservation Needs Inventory (*9*), much of the existing woodland would benefit from stand improvement by thinning out mature trees and undesirable species. Many areas that are naturally reforested would benefit from tree planting and weed control. Protection from grazing and fire and control of disease and insects are also needed to improve woodlands.

Table 6 contains information useful to woodland owners or forest managers planning use of soils for wood crops. Mapping unit symbols for soils suitable for wood crops are listed, and the ordination (woodland suitability) symbol for each soil is given. All soils bearing the same ordination symbol require the same general kinds of woodland management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates insignificant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the following order: x, w, t, d, c, s, f, and r.

In table 6 the soils are also rated for a number of factors to be considered in management. *Slight*, *moderate*, and *severe* are used to indicate the degree of major soil limitations.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if some measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or equipment; *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree that the soil affects expected mortality of planted tree seedlings when plant competition is not a limiting factor. Seedlings

from good planting stock that are properly planted during a period of sufficient rainfall are rated. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Considered in the ratings of *windthrow hazard* are characteristics of the soil that affect the development of tree roots and the ability of soil to hold trees firmly. A rating of *slight* indicates that trees in wooded areas are not expected to be blown down by commonly occurring winds; *moderate*, that some trees are blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

The *potential productivity* of merchantable trees or *important trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Important trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suitable for commercial wood production and that are suited to the soils.

Recreation

BRUCE CURRIE, soil scientist, Soil Conservation Service, assisted in preparing this section.

There is an increasing demand throughout the county for land and facilities for outdoor recreation activities, including boating, swimming, picnicking, fishing, hunting, hiking, and camping. Most of the acres of public lands in forests, lakes, parks, and open space are presently available for these uses in Jackson County. The Shawnee National Forest, Cedar and Kinkaid Lakes, and Murphysboro and Giant City state parks provide the major part of the available facilities.

The potential for additional development of recreation facilities is favorable throughout the county. Areas having the greatest potential are in soil associations 8 and 9 (see "General Soil Map for Broad Land Use Planning"). These associations are dominated by hilly terrain, wooded slopes, rock formations, and numerous streams that provide a variety of recreation opportunities.

The soils of the survey area are rated in table 7 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

The degree of the limitation of the soils is expressed as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 7 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 10, and interpretations for dwellings without basements and for local roads and streets, given in table 9.

Camp areas require such site preparation as shaping and leveling for tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils for this use have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that will increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bedrock or hardpan should be enough to allow necessary grading.

Paths and trails for walking, horseback riding, bicycling, and other uses should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the annual period of use. They should have moderate slopes and have few or no stones or boulders on the surface.

Wildlife Habitat

BRUCE CURRIE, soil scientist, Soil Conservation Service, assisted in the preparation of this section.

Wildlife is abundant in Jackson County. Species and types of habitat vary considerably. There are hilly forests, rolling pastures, level cropland, and swampy areas. Deer, squirrels, rabbits, quail, wild turkey, songbirds, and ducks are common. Fox, raccoons, groundhogs, hawks, and doves thrive in the same habitat.

The use of the soils for wildlife habitat does not necessarily mean that definite areas must be set aside for this purpose. Wildlife is secondary on land used for grain, hay, pasture, or forest. It is the primary use on land especially set aside for wildlife.

Wildlife in Jackson County can be divided into three categories—openland wildlife, woodland wildlife, and wetland wildlife.

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the construction of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, inadequate, or inaccessible, wildlife either are scarce or do not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by helping the natural establishment of desirable plants.

In table 8, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

The elements of wildlife habitat are briefly described in the following paragraphs.

Grain and seed crops are seed-producing annuals used by wildlife. Examples are corn, wheat, oats, and barley. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Examples are fescue, bromegrass, clover, and alfalfa. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Examples are goldenrod, beggarweed, and ragweed. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations.

Hardwood trees and the associated woody understory provide cover for wildlife and produce nuts or other fruit, buds, catkins, twigs, bark, or foliage that wildlife eat. Examples of native plants are oak, poplar, cherry, sweetgum, apple, dogwood, hickory, and blackberry. Examples of fruit-producing shrubs that are commercially available and suitable for planting on soils rated good are Russian-olive, autumn-olive, and crabapple. Major soil properties that affect growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness.

Coniferous plants are cone-bearing trees, shrubs, or ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Examples are pine and cedar. Soil properties that have a major effect on the growth of coniferous plants are depth of the root zone, available water capacity, and wetness.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Examples of wetland plants are smartweed and wild millet and rushes, sedges, and reeds. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control devices in marshes or streams. Examples are marshes, waterfowl feeding areas, and ponds. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The kinds of wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail rabbit, and red fox.

Woodland habitat consists of areas of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, woodcock, thrushes, woodpeckers, squirrels, grey fox, raccoon, and deer.

Wetland habitat consists of open, marshy or swampy, shallow-water areas where water-tolerant plants grow. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this section are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil Properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to: (1) select potential residential, commercial, industrial, and recreational uses; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. Table 9 shows, for each kind of soil, the degree and kind of limitations for building site development; table 10, for sanitary facilities; and table 12, for water management. Table 11 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have a special meaning in soil science. Many of these terms are defined in the Glossary.

Building Site Development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 9. A *slight* limitation indicates that soil properties are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates one or more soil properties or site features so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are used for pipelines, sewerlines, communications and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by the soil wetness of a high seasonal water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is defined, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and *small commercial buildings* referred to in table 9 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table 9 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Sanitary Facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 10 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good, fair*, or *poor*, which mean about the same as the terms *slight, moderate*, and *severe*.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope may cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

Percolation tests are performed to determine the absorptive capacity of the soil and its suitability for septic tank absorption fields. These tests should be performed during the season when the water table is highest and the soil is at minimum absorptive capacity.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table could be installed or the size of the absorption field could be increased so that performance is satisfactory.

Sewage lagoon areas are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Soils that are very high in content of organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. Where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soils affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with thin layers of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations in table 10 apply only to the soil material within a depth of about 5 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

In the area type of sanitary landfill, refuse is placed on the surface of the soil in successive layers. The limitations caused by soil texture, depth to bedrock, and stone content do not apply to this type of landfill. Soil wetness, however, may be a limitation because of difficulty in operating equipment.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction Materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 11 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 13 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential, low potential frost action, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor.*

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 11 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 13.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slopes, and amount of stones. The ability of the soil to support plantlife is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can limit or prevent plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated *poor* are very sandy soils and very firm clayey soils; soils with suitable layers less than 8 inches thick; soils having large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water Management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 12 the soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

Aquifer-fed excavated ponds are bodies of water made by excavating a pit or dugout into a ground-water aquifer. Excluded are ponds that are fed by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Ratings in table 12 are for ponds that are properly designed, located, and constructed. Soil properties and site features that affect aquifer-fed ponds are depth to a permanent water table, permeability of the aquifer, quality of the water, and ease of excavation.

Drainage of soil is affected by such soil properties as permeability, texture, depth to bedrock, hardpan, or other layers that affect the rate of water movement, depth to the water table, slope, stability of ditchbanks, susceptibility to flooding, salinity and alkalinity, and availability of outlets for drainage.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at a nonerosive velocity. Features that affect the use of soils for waterways are slope, permeability, erodibility, wetness, and suitability for permanent vegetation.

Soil Properties

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of en-

gineering properties, the engineering classification, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present pertinent soil and water features, engineering test data, and data obtained from physical and chemical laboratory analyses of soils.

Engineering Properties

Table 13 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 13 gives information for each of these contrasting horizons in a typical profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil Series and Morphology."

Texture is described in table 13 in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (Unified) (*8*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*1*).

The *Unified* system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested in the survey area, with group index numbers in parentheses, is given in table 16. The estimated classification, without group index numbers, is given in table 13. Also in table 13 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

Physical and Chemical Properties

Table 14 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use

the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Wind erodibility groups are made up of soils that have similar properties that affect their resistance to soil blowing if cultivated. The groups are used to predict the susceptibility of soil to blowing and the amount of soil lost as a result of blowing. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are extremely erodible, so vegetation is difficult to establish. They are generally not suitable for crops.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible, but crops can be grown if intensive measures to control soil blowing are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible, but crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible, but crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible, but crops can be grown if measures to control soil blowing are used.

5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible, but crops can be grown if measures to control soil blowing are used.

6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible, and crops can easily be grown.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible, and crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to soil blowing.

Soil and Water Features

Table 15 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep to deep, moderately well drained to well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods after rains or after snow melts is not considered flooding nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding; and on information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated in Table 15 are the depth to the seasonal high water table; the kind of water table, that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the soil mapping. The kind of bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Potential frost action refers to the likelihood of damage to pavements and other structures by frost heaving and low soil strength after thawing. Frost action results from the movement of soil moisture into the freezing temperature zone in the soil, which causes ice lenses to form. Soil texture, temperature, moisture content, porosity, permeability, and content of organic matter are the most important soil properties that affect frost action. It is assumed that the soil is not covered by insulating vegetation or snow and is not artificially drained. Silty and clayey soils that have a high water table in winter are most susceptible to frost action. Well drained very gravelly or sandy soils are the least susceptible.

Test Data

Table 16 shows test data for samples of several types of soil in Jackson County. The test results do not represent the entire range of characteristics of soils within the county, nor do they represent the entire range of characteristics of the soils tested. The results, nevertheless, can be used as a general guide in estimating properties of the other soils in the county.

Moisture-density data are obtained by compacting soil material at a successively higher moisture content. Assuming that the compactive effort remains constant, the density of the compacted material increases until the optimum moisture content is reached. After that, the density decreases with increase in moisture content. The highest dry density obtained in the compaction test is termed maximum dry density. Generally, optimum stability is obtained if the soil is compacted to about the maximum dry density when it is at approximately the optimum moisture content.

Mechanical analysis refers to the measurement of the amounts of various size classes of soil grains (sand, silt, or clay) in a sample. The proportions of each determine the textural class of the material. Names used by engineers for various size classes of particles differ from those used by soil scientists. For example, fine sand in engineering terminology consists of particles 0.42 to 0.74 millimeter in diameter, whereas fine sand, as determined by the soil scientist, consists of particles 0.25 to 0.10 millimeter in diameter.

Tests to determine liquid limit and plastic limit measure the effect of water on the consistence of the soil material. As the moisture content of a clayey soil is increased from a very dry state, the material changes from

a semisolid to a plastic state. As the moisture content is further increased, the material changes from a plastic state to a liquid. The plastic limit is the moisture content at which the soil material passes from a semisolid to a plastic state. The liquid limit is the moisture content at which the material passes from a plastic state to a liquid. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which soil material is in a plastic condition.

Formation of the Soils

LEWIS DUNGAN, soil scientist, in cooperation with LEON FOLLMER, geologist, Illinois State Geological Survey, prepared this section.

This section discusses the factors of soil formation and briefly describes their effect on the soils of Jackson County.

Soil is formed by the action of soil-forming processes on material deposited or accumulated by geologic agencies. The characteristics of the soil at any given point are determined by (1) the physical and mineralogical composition of the parent material; (2) the plant and animal life on and in the soil; (3) the topography or lay of the land; (4) the climate under which the soil material has accumulated and existed since accumulation; and (5) the length of time the forces of soil development have acted on the soil material.

Parent Material

Parent material is the unconsolidated mass in which the soils have formed. It determines the mineralogical and chemical composition of the soil and, to a large extent, the rate at which soil-forming processes take place.

The soils of Jackson County have formed in loess, alluvium, lacustrine sediments, glacial drift, and material that weathered from bedrock. Figure 13 shows a generalized relationship of some of the major soils and the parent materials (*11*).

Loess, a wind-deposited material, is the most extensive and most important parent material because it blankets many of the other materials. About half of the soils in the county are formed in loess. The loess is thickest along the Mississippi Valley, 25 to 30 feet thick on the bluffs, and thins to a minimum of about 4 or 5 feet in the northeastern part of the county on the ridgetops. Most areas have 2 layers of loess. The upper layer is the Peoria Loess, which is gray and yellowish brown silt loam. Alford soils formed in areas where the Peoria Loess is thickest. The lower layer is the Roxana Silt. This material is usually distinctly browner than the Peoria Loess and was weathered before being covered by the Peoria Loess. The Roxana Silt is less permeable and more dense than the Peoria Loess. In areas where the Peoria Loess is thinner and the Roxana Silt is closer to the surface, Roxana Silt has a greater influence on the modern soil. Ava and Bluford are examples of soils that formed in both loess deposits.

Soils on flood plains and bottom lands in the county formed in water-laid materials or alluvium. Many of these soils are still receiving sediment. These materials range from sand to clay. Darwin and Jacob soils formed in clayey alluvial sediments of the slack-water deposits from the Mississippi River. These soils are on broad flats and in sloughs and old channels. Haymond and Wakeland soils formed in silty material on flood plains or alluvial fans. Ware soils formed in sandy alluvial deposits. These soils are on natural levees along old channels.

Lacustrine sediments were deposited by water along the Big Muddy River and its tributaries during glaciation. The Big Muddy River was blocked, forming a slack-water lake (*2*). The deposits from the lake generally range from 30 to 60 feet in thickness, with a maximum in some places up to 150 feet. Textures of these materials vary and are related to the energy of the water at the time of deposition. Alvin soils formed in sandy materials. Camden soils formed in silty and stratified silty and sandy materials, and Colp and Hurst soils formed in the clayey material.

The Illinoian Glacier covered the northern three-fourths of Jackson County. Except for the northeastern part of the county, the glacial deposits are generally thin and discontinuous. Most of these deposits have subsequently been covered by deposits of other parent materials and, except for areas of glacial materials exposed on the steeper side slopes, they have little influence on soils. Hickory soils formed in the exposed glacial material.

A small percentage of the soils formed in material that weathered from sandstone, siltstone, shale, limestone, or cherty limestone bedrock. Most of these soils are on steep side slopes. Neotoma soils formed from sandstone. Goss soils formed from cherty limestone. Some of these materials underlie a thin loess deposit. An example is the Wellston soils, which formed in loess and sandstone, siltstone, or shale.

Plant and Animal Life

All living organisms, such as vegetation, animals, bacteria, and fungi, are important to soil formation. Vegetation generally determines the amount of organic matter, the color of the surface layer, and the amount of nutrients. Most of the soils in Jackson County formed under forest vegetation and have a light colored surface layer, for example, Alford and Hosmer soils. Some soils formed under grass vegetation and have a dark colored surface layer. These soils contain more organic matter than those that formed under trees. Raddle and Darwin soils are examples of dark colored soils on terraces and bottom lands, and Hoyleton soil is an example of a dark colored soil on the uplands.

Burrowing animals help to keep the soil open and porous. Bacteria and fungi aid in the decomposition of plant and animal remains.

Topography

Many differences among soils of the county are caused by topography. Slope, or lay of the land, affects drainage, runoff, erosion, and deposition. Slopes differ in gradient, length, shape, and exposure. Some or all of these slope characteristics are responsible for the differences among soils that are derived from similar parent materials, such as Alford, Stoy, and Wynoose soils. Soils that formed in different parent materials but on similar topography have similar natural drainage characteristics, for example, Alford and Hickory soils.

When steepness of slope increases, runoff is greater and erosion is increased. Erosion constantly changes characteristics of soils. This is demonstrated by comparing the severely eroded, eroded, and uneroded soils of the Alford series.

Where slope is nearly level and water has been able to move through the parent material, soils with a high clay content in the subsoil have formed. Wynoose soils are an example.

Climate

Climate is important in soil formation because it influences the kind of plants and determines the type of weathering. The humid temperate climate of Jackson County has favored the rapid breakdown or weathering of soil materials, the formation of clay, and the downward movement of these materials in the soil profile. Most upland soils of the county have more clay in the subsoil than in the surface layer. For more detailed information on climate, refer to the section "General Nature of the County."

Time

The formation of soils requires a long time. Changes take place slowly in the parent materials. The age of soils is determined by the degree of soil development in a soil profile. Those soils with little or no development are immature. Those having well expressed horizons are mature, even if the parent materials in which they formed are the same age as that of the parent material in which an immature soil formed. Haymond soils on the bottom lands are examples of somewhat young soils. They are still accumulating deposits from flooding and have only weakly developed horizons. Banlic soils formed in similar sediment, but sediment has been deposited long enough for a distinct profile to develop.

Classification

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to the latest literature available (*7*).

The system of classification has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 17, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Fluvaquents (*Fluv*, meaning composed of recent alluvium, plus *aquent*, the suborder of Entisols that have an aquic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceeding the name of the great group. The adjective *Typic* identifies the subgroup that is thought to typify the great group. An example is Typic Fluvaquents.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is fine-silty, mixed, nonacid, mesic, Typic Fluvaquents.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition.

Soil Series and Morphology

In this section, each soil series recognized in the survey area is described in detail. The descriptions are arranged in alphabetic order by series name.

Characteristics of the soil and the material in which it formed are discussed for each series. The soil is then compared to similar soils and to nearby soils of other series. Then a pedon, a small three-dimensional area of soil typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*6*). Unless otherwise noted, colors described are for moist soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or mapping units, of each soil series are described in the section "Soil Maps for Detailed Planning."

Alford Series

The Alford series consists of well drained, moderately permeable soils that formed in loess. Alford soils are on ridgetops and hillsides in the uplands. Slopes range from 2 to 50 percent but are predominantly 2 to 30 percent.

Alford soils are on hillsides with Wellston and Hickory soils and on upper slopes and ridgetops with Hosmer soils. Alford soils lack the sand or coarse fragments in the solum of Wellston and Hickory soils and do not have the dense compact subsoil of Hosmer soils.

Typical pedon of Alford silt loam, 2 to 6 percent slopes, eroded, approximately 693 feet north and 1,177 feet west of the southeast corner of sec. 14, T. 9 S., R. 3 W., in a cultivated field:

Ap—0 to 8 inches; yellowish brown (10YR 5/4) silt loam mixed with some strong brown (7.5YR 5/6) silty clay loam; moderate fine and medium granular structure; friable; few fine dark concretions; slightly acid; abrupt smooth boundary.

B21t—8 to 18 inches; strong brown (7.5YR 5/6) silty clay loam; moderate fine and medium prismatic structure parting to moderate fine subangular blocky; firm; continuous dark brown (7.5YR 4/4) clay films and few patchy light gray (10YR 7/2 dry) uncoated silt grains on faces of peds; few fine dark concretions; medium acid; gradual smooth boundary.

B22t—18 to 26 inches; strong brown (7.5YR 5/6) silty clay loam; moderate fine and medium prismatic structure parting to strong fine and medium angular and subangular blocky; firm; continuous dark brown (7.5YR 4/4) clay films and continuous light gray (7.5YR 7/2 dry) uncoated silt grains on faces of peds; few fine dark concretions and stains; very strongly acid; clear smooth boundary.

B23t—26 to 33 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium prismatic structure parting to moderate medium angular and subangular blocky; firm; continuous dark brown (7.5YR 4/4) clay films and patchy light gray (10YR 1/2 dry) uncoated silt grains on faces of peds; few fine dark concretions and stains; very strongly acid; clear smooth boundary.

B24t—33 to 42 inches; strong brown (7.5YR 5/6) light silty clay loam; moderate medium and coarse prismatic structure parting to moderate medium and coarse subangular blocky; firm; discontinuous dark brown (7.5YR 4/4) clay films and patchy light gray (10YR 7/2 dry) uncoated silt grains on vertical faces of peds; common fine dark stains; very strongly acid; gradual smooth boundary.

B31t—42 to 52 inches; brown (7.5YR 4/4) light silty clay loam; moderate coarse prismatic structure parting to weak coarse subangular blocky; firm; continuous dark brown (7.5YR 4/4) clay films and patchy light brownish gray (10YR 6/2 dry) uncoated silt grains on vertical faces of peds; few streaks of light brownish gray (2.5Y 6/2); common fine dark stains; strongly acid; gradual smooth boundary.

B32t—52 to 66 inches; brown (7.5YR 4/4) heavy silt loam; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; discontinuous dark brown (7.5YR 4/4) clay films and patchy light gray (10YR 7/2 dry) uncoated silt grains on vertical faces of peds; many fine dark stains; strongly acid.

Thickness of the solum ranges from about 45 to 72 inches. Reaction ranges from medium acid to very strongly acid throughout the pedon, except in areas where the surface layer has been limed.

The Ap or A1 horizon is dominantly brown (10YR 4/3) or yellowish brown (10YR 5/4) but can also be very dark grayish brown (10YR 3/2) in wooded areas.

The B2t horizon is heavy silt loam or silty clay loam in colors that have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8.

Alvin Series

The Alvin series consists of well drained and moderately well drained, moderately permeable or moderately rapidly permeable soils that formed in sandy sediments. Alvin soils are on broad to narrow ridges and side slopes of terraces. Slopes range from 1 to 25 percent but are predominantly 1 to 10 percent.

Alvin soils are commonly on the same landscape as Camden, St. Charles, and Starks soils. Alvin soils have more sand in the solum, particularly the upper part of the B horizon, than Camden, St. Charles, or Starks soils and also are less gray in the B horizon than Starks soils.

Typical pedon of Alvin very fine sandy loam, 1 to 7 percent slopes, approximately 165 feet north and 66 feet west of the center of sec. 25, T. 8 S., R. 2 W., in a cultivated field:

Ap—0 to 7 inches; dark brown (10YR 4/3) very fine sandy loam; weak very fine granular structure; very friable; many roots; medium acid; abrupt smooth boundary.

A2—7 to 11 inches; dark brown (10YR 4/3) and brown (10YR 5/3) very fine sandy loam; weak fine granular structure; very friable; many roots; few fine concretions (iron and manganese oxides); medium acid; clear smooth boundary.

B1—11 to 14 inches; dark yellowish brown (10YR 4/4) loam; weak, very fine subangular blocky structure; friable; many roots; few light gray (10YR 7/2 dry) uncoated silt grains on faces of peds; common fine dark stains and concretions (iron and manganese oxides); medium acid; clear smooth boundary.

B21t—14 to 23 inches; dark yellowish brown (10YR 4/4) heavy loam; moderate very fine and fine angular blocky structure; firm; few roots; discontinuous dark brown (7.5YR 4/4) clay films and light gray (10YR 7/2 dry) uncoated silt grains on faces of peds; common fine concretions (iron and manganese oxides); medium acid; clear smooth boundary.

B22t—23 to 28 inches; dark brown (7.5YR 4/4) loam; moderate fine and medium subangular blocky structure; firm; few roots; discontinuous dark brown (7.5YR 4/4) clay films and discontinuous light gray (10YR 7/2 dry) uncoated silt grains on faces of peds; few fine concretions (iron and manganese oxides); medium acid; clear smooth boundary.

B23t—28 to 38 inches; dark brown (7.5YR 4/4) fine sandy loam; weak medium subangular blocky structure; firm; few roots; discontinuous dark reddish brown (5YR 3/4) clay films and discontinuous light gray (10YR 7/2 dry) uncoated silt grains on ped faces; few fine concretions (iron and manganese oxides); medium acid; clear smooth boundary.

B3t—38 to 49 inches; dark brown (7.5YR 4/4) loamy fine sand; weak coarse subangular blocky structure; friable; discontinuous dark reddish brown (5YR 3/4) clay films and light yellowish brown (10YR 6/4) sand grains on faces of peds; few fine black (N 2/0) stains and concretions (iron and manganese oxides); medium acid; abrupt smooth boundary.

C—49 to 64 inches; yellowish brown (10YR 5/4, 5/8) and light yellowish brown (10YR 6/4) fine sand; single grained; loose; noticeable stratification; medium acid.

The A horizon is very fine sandy loam or fine sandy loam. The B horizon is fine sandy loam or loam, and some pedons have thin layers of sandy clay loam. Reaction of the B horizon ranges from medium acid to very strongly acid.

Ava Series

The Ava series consists of moderately well drained, moderately slowly permeable to very slowly permeable soils that formed in loess overlying loamy material. Ava soils are on narrow and broad ridgetops and side slopes in the uplands. Slopes are mainly 2 to 12 percent but range from 2 to 18 percent.

Ava soils are on the same landscape as Bluford and Hickory soils and have pedons similar to those of Hosmer soils. Ava soils lack the gray colors of Bluford soils and have less clay in the upper part of the B2 horizon than those soils. They have a Bx horizon and have less sand and pebbles in the solum than Hickory soils. Ava soils contain more sand in the Bx horizon than Hosmer soils.

Typical pedon of Ava silt loam, 2 to 6 percent slopes, approximately 410 feet south and 990 feet east of the northwest corner of sec. 15, T. 7 S., R. 2 W., in a cultivated field:

Ap—0 to 7 inches; dark brown (10YR 4/3) silt loam; moderate medium granular structure; friable; mildly alkaline; abrupt smooth boundary.

B21t—7 to 17 inches; brownish yellow (10YR 6/6) heavy silt loam; weak fine subangular blocky structure; friable; patchy thin yellowish brown (10YR 5/6) clay films on faces of peds; very strongly acid; gradual smooth boundary.

B22t—17 to 20 inches; brownish yellow (10YR 6/6) heavy silt loam; moderate medium subangular blocky structure; firm; patchy thin yellowish brown (10YR 5/6) clay films and light gray (10YR 7/2) uncoated silt grains on faces of peds; very strongly acid; abrupt smooth boundary.

B&A—20 to 23 inches; strong brown (7.5YR 5/6) light silty clay loam (B2t) and light gray (10YR 7/2) silt (A2); moderate medium subangular blocky structure; firm; patchy thin brown (7.5YR 4/4) clay films on faces of peds; extremely acid; abrupt smooth boundary.

B'21t—23 to 27 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct light brownish gray (10YR 6/2) and pale brown (10YR 6/3) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; patchy thin brown (7.5YR 4/4) clay films and light gray (10YR 7/2) uncoated silt grains on faces of peds; very strongly acid; clear smooth boundary.

B'22t—27 to 39 inches; strong brown (7.5YR 5/6) heavy silt loam; common medium distinct light brownish gray (10YR 6/2) and pale brown (10YR 6/3) mottles; moderate medium prismatic structure parting to weak coarse subangular blocky; firm and slightly brittle; patchy thin light brown (7.5YR 6/4) clay films and light gray (10YR 7/2) uncoated silt grains on faces of peds; common dark stains; very strongly acid; gradual smooth boundary.

Bx1—39 to 48 inches; strong brown (7.5YR 5/6) heavy silt loam; many medium distinct grayish brown (10YR 5/2), light brownish gray (10YR 6/2), and pale brown (10YR 6/3) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; firm and brittle; patchy light gray (10YR 7/2) uncoated silt grains on faces of peds; common dark stains; very strongly acid; gradual smooth boundary.

IIBx2—48 to 57 inches; brown (7.5YR 5/4) silt loam; many medium prominent light brownish gray (2.5Y 6/2) mottles; weak coarse prismatic structure parting to moderate thick platy; firm and brittle; few light gray (10YR 7/2) uncoated silt grains and dark stains on faces of peds; common sand grains; strongly acid.

IICx—57 to 68 inches; dark brown (7.5YR 4/4) and pinkish gray (7.5YR 6/2) silt loam; massive in thick, platy layers; firm and brittle; dark stains along cracks; medium acid.

Depth to the Bx horizon ranges from about 24 to 40 inches. Depth to the IIBx horizon ranges from 40 to 55 inches. The B2t and Bx horizons range from extremely acid to strongly acid.

Banlic Series

The Banlic series consists of somewhat poorly drained, slowly permeable soils that formed in silty alluvium. Banlic soils are on slight rises on flood plains of bottom land. Slopes range from 0 to 3 percent.

Banlic soils are on the same flood plains as Belknap, Bonnie, Wakeland, and Haymond soils. Banlic soils have a dense or compact layer in the lower part of the solum (Bx horizon) that Belknap, Bonnie, Wakeland, and Haymond soils do not have. Also, they have browner colors than Bonnie soils and grayer colors than Haymond soils.

Typical pedon of Banlic silt loam, approximately 462 feet north and 429 feet east of the southwest corner of sec. 13, T. 9 S., R. 1 W., in a meadow:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; common medium faint grayish brown (10YR 5/2) mottles; moderate fine granular structure; friable; few fine concretions; many fine dark yellowish brown (10YR 3/4) stains; neutral; abrupt smooth boundary.

A2—8 to 17 inches; brown (10YR 5/3) silt loam; few fine faint gray (10YR 5/1) and few medium faint light brownish gray (10YR 6/2) mottles; weak fine subangular blocky parting to moderate fine granular structure; friable; common fine and medium concretions; many fine dark yellowish brown (10YR 3/4) stains; very strongly acid; gradual smooth boundary.

B1—17 to 26 inches; brown (10YR 5/3) silt loam; many medium faint light brownish gray (10YR 6/2) and common fine and medium faint yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable to firm; many fine and medium concretions; many fine and medium dark yellowish brown (10YR 3/4) stains and soft bodies; very strongly acid; abrupt smooth boundary.

Bx1—26 to 39 inches; light brownish gray (10YR 6/2) and brown (10YR 5/3) silt loam; few fine and medium faint yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to weak fine subangular blocky; firm, brittle; some pores coated with dark brown (10YR 4/3) clay films; patchy white (10YR 8/1 dry) uncoated silt grains on faces of peds; few fine concretions; many medium and coarse dark yellowish brown (10YR 3/4) soft bodies and stains; very strongly acid; clear smooth boundary.

Bx2—39 to 50 inches; light brownish gray (10YR 6/2) and brown (10YR 5/3) silt loam; many medium and coarse distinct dark brown (7.5YR 4/4) mottles; weak coarse prismatic structure parting to weak medium subangular blocky; firm, brittle; some pores coated with dark brown (10YR 4/3) clay films; patchy white (10YR 8/1 dry) uncoated silt grains on faces of peds; few fine concretions; common dark stains; very strongly acid; clear smooth boundary.

C1—50 to 57 inches; light brownish gray (10YR 6/2) and brown (10YR 5/3) silt loam; common fine faint yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable; occasional pore coated with dark brown (10YR 4/3) clay films; common dark stains; strongly acid; clear smooth boundary.

C2—57 to 62 inches; light brownish gray (10YR 6/2) silt loam; few fine distinct yellowish brown (10YR 5/6) and many medium distinct dark yellowish brown (10YR 4/4) mottles; massive; firm; patchy white (10YR 8/1 dry) uncoated silt grains; common dark stains; medium acid.

Thickness of the solum ranges from about 48 to 65 inches. Depth to the Bx horizon ranges from 20 to 36 inches. Reaction ranges from strongly acid to extremely acid throughout the solum, except in areas where the surface layer has been limed.

Color of the surface layer can be grayish brown (10YR 5/2). The A2 horizon ranges from 8 to 18 inches in thickness and dominantly has chroma of 3 in the upper part and chroma of 2 in the lower part.

The Bx horizon has weak subangular blocky or prismatic structure and patchy clay films. Matrix colors have hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 or 3.

Belknap Series

The Belknap series consists of somewhat poorly drained, moderately permeable to moderately slowly permeable soils that formed in silty alluvium. Belknap soils are on bottom lands. Slopes range from 0 to 2 percent.

Belknap soils are on the same flood plains as Bonnie, Banlic, and Burnside soils. Belknap soils are less gray than the poorly drained Bonnie soils. They lack the dense, compact horizon of the Banlic soils and have fewer coarse fragments in the solum than Burnside soils. Belknap soils are more acid than Wakeland soils.

Typical pedon of Belknap silt loam, approximately 990 feet north and 1,250 feet west of the southeast corner of sec. 27, T. 9 S., R. 1 W., in a meadow:

A11—0 to 3 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

A12—3 to 8 inches; brown (10YR 4/3) silt loam; few fine distinct strong brown (7.5YR 5/6) mottles; weak fine and medium subangular blocky structure; friable; slightly acid; abrupt smooth boundary.

C1—8 to 17 inches; yellowish brown (10YR 5/4) silt loam; common medium distinct light brownish gray (10YR 6/2), pale brown (10YR 6/3), and strong brown (7.5YR 5/6) mottles; massive; friable; strongly acid; clear smooth boundary.

C2—17 to 30 inches; grayish brown (10YR 5/2) silt loam; many medium distinct yellowish brown (10YR 5/4) and common medium prominent yellowish red (5YR 5/6) mottles; massive; friable; common dark stains and concretions; weakly stratified; strongly acid; clear smooth boundary.

C3—30 to 41 inches; light brownish gray (2.5Y 6/2) silt loam; many medium distinct light olive brown (2.5Y 5/4) and common medium prominent strong brown (7.5YR 5/6) mottles; massive; friable; common dark stains and concretions; strongly acid; clear smooth boundary.

C4—41 to 50 inches; light brownish gray (2.5Y 6/2) silt loam; many medium distinct olive brown (2.5Y 4/4) and common medium prominent strong brown (7.5YR 5/6) mottles; massive; slightly sticky; perched water; many dark stains and concretions; strongly acid; abrupt smooth boundary.

C5—50 to 67 inches; light brownish gray (10YR 6/2) and light gray (10YR 7/2) silt loam; many medium distinct brown (10YR 4/3) and common medium distinct strong brown (7.5YR 5/6) mottles; weak fine and medium prismatic structure; firm, dense; many dark stains and concretions; strongly acid.

The A horizon ranges from neutral to medium acid. The C horizon, to a depth of 40 inches or more, is strongly acid or very strongly acid. The C horizon is predominantly silt loam, but strata of loam and fine sandy loam are in some pedons.

Birds Series

The Birds series consists of poorly drained, moderately slowly permeable soils that formed in silty stream sediments. Birds soils are mainly in depressions of the larger bottom lands. Slopes are commonly less than 1 percent but range from 0 to 2 percent.

Birds soils are on the same landscape as Wakeland soils and have pedons similar to those of Bonnie and Piopolis soils. They are grayer in the solum than Wakeland soils. They are less acid than Bonnie and Piopolis soils and are less clayey than Piopolis soils.

Typical pedon of Birds silt loam, approximately 1,980 feet north and 330 feet west of the southeast corner of sec. 26, T. 7 S., R. 3 W., in a cultivated field:

Ap—0 to 7 inches; light gray (10YR 6/1) and grayish brown (10YR 5/2) silt loam; common medium distinct light yellowish brown (10YR 6/4) and few fine prominent pink (5YR 7/4) and black (N/2) mottles; weak fine granular structure; friable; many roots; neutral; clear smooth boundary.

C1g—7 to 21 inches; gray (10YR 6/1) silt loam; common medium distinct light olive brown (2.5Y 5/4) and very pale brown (10YR 7/4) mottles; weak fine granular structure and massive; friable; many roots; neutral; clear smooth boundary.

C2g—21 to 30 inches; gray (10YR 5/1) silt loam; common medium distinct light yellowish brown (10YR 6/4) and few fine prominent dark red (2.5YR 3/6) mottles; massive; friable; common roots; neutral; gradual smooth boundary.

C3g—30 to 60 inches; gray (5Y 5/1) silt loam; few common distinct light yellowish brown (10YR 6/4) and light gray (10YR 7/1) mottles; massive; friable; few dark stains; neutral.

The C horizon is generally medium acid to mildly alkaline, but some pedons have subhorizons that are strongly acid. Thin strata of loam and silty clay loam are in the C horizon of some pedons.

Bluford Series

The Bluford series consists of somewhat poorly drained, moderately permeable to slowly permeable soils that formed in loess and the underlying loamy material. Bluford soils are on narrow to broad ridgetops, side slopes, and foot slopes and at the head of drainageways in the uplands. Slopes range from 0 to 7 percent.

Bluford soils are on the same landscape as Ava and Wynoose soils. They have grayer colors and more clay in the B2t horizon than Ava soils and are less gray in the B2t horizon than Wynoose soils. Bluford soils have pedons similar to those of Stoy and Hoyleton soils but have less clay in the B2t horizon than Stoy soils and have a thinner and lighter colored A1 horizon than Hoyleton soils.

Typical pedon of Bluford silt loam, 0 to 2 percent slopes, approximately 81 feet south and 1,980 feet east of the northwest corner of sec. 23, T. 7 S., R. 2 W., in a cultivated field:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) (90 percent), and brown (10YR 5/3) (10 percent) silt loam; weak fine granular structure; friable; few fine concretions; neutral; abrupt smooth boundary.

A21—8 to 13 inches; brown (10YR 5/3) and yellowish brown (10YR 5/4) silt loam; weak very thin platy structure parting to weak fine granular; friable; common fine concretions; some very dark grayish brown (10YR 3/2) worm casts; extremely acid; clear smooth boundary.

A22—13 to 18 inches; pale brown (10YR 6/3) silt loam with many fine distinct yellowish brown (10YR 5/8) mottles; weak very thin platy structure parting to weak very fine subangular blocky; friable; common fine and medium concretions; extremely acid; clear wavy boundary.

B1t—18 to 21 inches; dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) silty clay loam; weak fine prismatic structure parting to moderate very fine subangular blocky structure; firm; discontinuous grayish brown (10YR 5/2) clay films and thick white (10YR 8/1 dry) uncoated silt grains on faces of peds; common fine concretions; extremely acid; clear smooth boundary.

B21t—21 to 29 inches; dark yellowish brown (10YR 4/4) light silty clay; moderate fine prismatic structure parting to moderate fine angular blocky; very firm; continuous grayish brown (10YR 5/2) clay films and discontinuous white (10YR 8/1 dry) uncoated silt grains on faces of peds; common fine concretions; extremely acid; gradual smooth boundary.

B22t—29 to 37 inches; brown (10YR 5/3) heavy silty clay loam; common fine distinct yellowish brown (10YR 5/6) and common fine faint grayish brown (10YR 5/2) mottles; moderate medium prismatic structure parting to moderate fine and medium angular and subangular blocky; very firm; continuous brown (10YR 5/3) and grayish brown (10YR 5/2) clay films and discontinuous white (10YR 8/1 dry) uncoated silt grains on faces of peds; common fine concretions; very strongly acid; clear smooth boundary.

B23t—37 to 46 inches; brown (10YR 5/3) and grayish brown (10YR 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; brown (10YR 5/3) and dark brown (10YR 4/3) clay films and thick white (10YR 8/1 dry) uncoated silt grains on faces of peds; many fine and medium concretions and stains; very strongly acid; clear smooth boundary.

IIBx1—46 to 56 inches; brown (7.5YR 4/4) heavy silt loam; many medium distinct light brownish gray (10YR 6/2) mottles; weak medium prismatic structure parting to weak coarse subangular blocky; firm, slightly brittle; patchy brown (10YR 5/3) clay films and patchy white (10YR 8/1 dry) uncoated silt grains on faces of peds; many dark stains; strongly acid; gradual smooth boundary.

IIBx2—56 to 72 inches; brown (7.5YR 4/4) silt loam; many medium distinct light brownish gray (10YR 6/2) mottles; weak coarse prismatic structure and massive; firm, slightly brittle; common stains; grayish brown (10YR 5/2) filling in krotovina; platy layering; medium acid.

The thickness of the A horizon ranges from 12 to 20 inches. The B horizon is commonly very strongly acid but ranges from extremely acid to medium acid. The upper part of the B2t horizon is heavy silty clay loam or light silty clay. Depth to the Bx horizon ranges from about 36 to 50 inches.

Bonnie Series

The Bonnie series consists of poorly drained, moderately permeable to slowly permeable soils that formed in silty alluvium. Bonnie soils are in low-lying areas or depressions of flood plains. Slopes are commonly less than 1 percent but range from 0 to 2 percent.

Bonnie soils are on the same flood plains as Belknap, Banlic, and Wakeland soils and have pedons similar to those of Piopolis and Birds soils. Bonnie soils are less gray in the upper part of the solum than Belknap, Banlic, and Wakeland soils. They have a less clayey solum than Piopolis soils and are more acid than Birds and Wakeland soils.

Typical pedon of Bonnie silt loam, approximately 165 feet north and 300 feet east of the southwest corner of sec. 16, T. 7 S., R. 1 W., in a cultivated field:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate fine granular structure; friable; many roots; strongly acid; abrupt smooth boundary.

C1g—7 to 31 inches; gray (10YR 6/1) silt loam; common fine distinct yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), and yellow (10YR 7/6) mottles; massive; friable; few roots; very strongly acid; gradual smooth boundary.

C2g—31 to 45 inches; light brownish gray (10YR 6/2) silt loam; common fine distinct light gray (10YR 7/2) mottles; massive; friable; very strongly acid; gradual smooth boundary.

C3—45 to 60 inches; brown (10YR 5/3) silt loam; common fine faint grayish brown (10YR 5/2) and few medium distinct yellowish brown (10YR 5/6) mottles; weak fine and medium subangular blocky structure; firm and slightly brittle; few dark stains (iron and manganese oxides); few clay films in pores; very strongly acid.

The control section is strongly acid or very strongly acid, but the lower part of the C horizon is medium acid or slightly acid in some pedons. Thin strata of silty clay loam are in the C horizon of some pedons.

Booker Series

The Booker series consists of very poorly drained and poorly drained, very slowly permeable soils that formed in clayey slack-water sediments. Booker soils are on broad flats and narrow channels of the Mississippi River bottom land. Slopes range from 0 to 2 percent.

Booker soils have pedons similar to those of Jacob, Karnak, Darwin, and Cairo soils and commonly occur with those soils. Booker soils have a darker and thicker A1 horizon than Jacob or Karnak soils and have a more acid solum than Darwin, Karnak, or Cairo soils. Also, they lack the loamy texture in the lower part of the subsoil that is characteristic of Cairo soils.

Typical pedon of Booker silty clay, approximately 570 feet south and 495 feet east of the center of sec. 20, T. 9 S., R. 3 W., in a wooded area:

A1—0 to 6 inches; very dark gray (10YR 3/1) silty clay; weak fine granular structure in the upper part and moderate fine angular blocky structure in the lower part; firm; few fine concretions (iron and manganese oxides); medium acid; clear smooth boundary.

A3g—6 to 12 inches; very dark gray (10YR 3/1) silty clay; common fine distinct dark yellowish brown (10YR 4/4) mottles; weak medium prismatic structure parting to weak fine and medium angular blocky; very firm; common fine and medium concretions (iron and manganese oxides); medium acid; clear smooth boundary.

B21g—12 to 22 inches; very dark gray (10YR 3/1) clay with many fine and medium distinct dark yellowish brown (10YR 4/6) mottles; weak medium prismatic structure parting to weak medium and coarse angular blocky; very firm, very plastic; few fine concretions (iron and manganese oxides); medium acid; gradual smooth boundary.

B22g—22 to 40 inches; very dark gray (10YR 3/1) clay; many fine distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure; very firm, very plastic; few fine concretions (iron and manganese oxides); few very dark gray (10YR 3/1) clay films on faces of peds; strongly acid; clear smooth boundary.

B3g—40 to 51 inches; very dark gray (10YR 3/1) clay; common fine distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure; very firm, very plastic; few fine concretions (iron and manganese oxides); common very dark gray (10YR 3/1) films on faces of peds; medium acid; clear smooth boundary.

C1g—51 to 63 inches; dark gray (5Y 4/1) clay; common fine prominent yellowish brown (10YR 5/6) mottles; massive; very firm, very plastic; few fine concretions (iron and manganese oxides); neutral; clear smooth boundary.

C2g—63 to 75 inches; dark gray (5Y 4/1) clay; many fine and medium prominent yellowish brown (10YR 5/6) mottles; massive; very firm; very plastic; few, fine concretions (iron and manganese oxides); slickensides; mildly alkaline.

The A horizon is silty clay or clay. The B2g horizon ranges from medium acid to extremely acid. The C horizon of some pedons contains strata of silty clay loam, clay loam, or sandy clay loam.

Bowdre Series

The Bowdre series consists of somewhat poorly drained, slowly permeable to moderately permeable soils that formed in clayey and loamy material. Bowdre soils are mainly on ridges along sloughs or overflow channels on the Mississippi River bottom land. Slopes range from 0 to 6 percent.

Bowdre soils are commonly on the same landscape as Cairo, Darwin, Medway, Gorham, and Ware soils. Bowdre soils are shallower to loamy material and are less gray in the solum than Cairo and Darwin soils. Bowdre soils have more clay in the upper part of the solum than Medway, Gorham, or Ware soils.

Typical pedon of Bowdre silty clay, approximately 84 feet north and 1,114 feet east of the southwest corner of sec. 21, T. 9 S., R. 4 W., in a cultivated field:

Ap—0 to 5 inches; very dark gray (10YR 3/1) silty clay; moderate fine and medium granular structure; very firm; slightly acid; clear smooth boundary.

A3—5 to 12 inches; very dark grayish brown (10YR 3/2) silty clay; moderate medium prismatic structure parting to moderate fine and medium angular blocky; very firm; very dark gray (10YR 3/1) coatings on faces of peds; slightly acid; clear smooth boundary.

B21—12 to 15 inches; dark grayish brown (10YR 4/2) silty clay; moderate medium prismatic structure parting to moderate fine and medium angular blocky; very firm; patchy very dark gray (10YR 3/1) coatings and light yellowish brown (10YR 6/4) sand grains on faces of peds; neutral; clear smooth boundary.

IIB22—15 to 19 inches; brown (10YR 5/3) light clay loam; weak medium prismatic structure parting to weak medium subangular blocky; firm; coatings of very dark grayish brown (10YR 3/2) in ped interiors; neutral; clear smooth boundary.

IIB3—19 to 28 inches; brown (10YR 4/3) very fine sandy loam; weak coarse subangular blocky structure; very friable; patchy dark brown (10YR 3/3) coatings on faces of peds; slightly acid; gradual wavy boundary.

IIC1—28 to 35 inches; yellowish brown (10YR 5/4) very fine sandy loam; very weak coarse subangular blocky structure and single grained; very friable; slightly acid; gradual wavy boundary.

IIC2—35 to 60 inches; pale brown (10YR 6/3) loamy very fine sand; single grained; very friable; pockets of fine sand; neutral.

Depth to loamy material ranges from 10 to 20 inches. Reaction ranges from slightly acid to mildly alkaline in the B horizon and from slightly acid to moderately alkaline in the C horizon. The lower part of the B2 horizon is silty clay loam, clay loam, or loam, and the B3 horizon is loam or very fine sandy loam. The C horizon is mainly very fine sandy loam or loamy very fine sand, but it can also be fine sandy loam, loamy fine sand, and sand and commonly has strata of finer material.

Burnside Series

The Burnside series consists of moderately well drained and well drained, moderately permeable soils that formed in silty stream sediments and the underlying channery or flaggy sediments that generally overlie bedrock at a depth of 4 to 7 feet. Burnside soils occur on small bottom lands. Slopes range from 0 to 4 percent.

Burnside soils are commonly on the same flood plains as Wakeland, Belknap, and Haymond soils. They contain more coarse fragments within a depth of 40 inches than Wakeland, Belknap, or Haymond soils. They are also better drained than the somewhat poorly drained Wakeland and Belknap soils.

Typical pedon of Burnside silt loam, approximately 2,510 feet north and 1,056 feet west of the southeast corner of sec. 24, T. 10 S., R. 1 W., in a wooded area:

A1—0 to 8 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; very friable; neutral; clear smooth boundary.

B1—8 to 18 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure parting to weak fine granular; friable; strongly acid; abrupt smooth boundary.

IIB2—18 to 24 inches; dark brown (10YR 4/3) very channery loam; weak medium subangular blocky structure; friable; 70 percent coarse fragments, 40 percent greater than 3 inches, 10 percent greater than 10 inches; strongly acid; gradual wavy boundary.

IIC—24 to 60 inches; dark brown (10YR 4/3) very flaggy sandy loam; single grained; loose; 80 percent coarse fragments, 55 percent greater than 3 inches and 15 percent greater than 10 inches; strongly acid.

Thickness of the silt loam upper horizons ranges from 12 to about 24 inches. Grayish mottles occur in some pedons below a depth of 20 inches. The B horizon ranges from medium acid to very strongly acid in reaction. The amount of coarse fragments in the IIB horizon ranges from 35 to 80 percent.

Cairo Series

The Cairo series consists of poorly drained, very slowly permeable to moderately permeable soils that formed in clayey sediments and the underlying loamy alluvial sediments. Cairo soils are on the intermediate terrain between ridges and depressions in the Mississippi River flood plain. Slopes range from 0 to 3 percent.

Cairo soils are on the same landscape as Gorham, Medway, Darwin, and Bowdre soils. Cairo soils contain more clay than Gorham soils and have more sand within a depth of 40 inches than Darwin soils. They are deeper to loamy material (the IIB horizon) than Bowdre and Medway soils.

The Cairo soils in this survey area contain less sand in the lower part of the control section than is defined as the range for the series. This difference does not alter the use or behavior of the soils.

Typical pedon of Cairo silty clay, approximately 453 feet north and 612 feet west of the southeast corner of sec. 26, T. 9 S., R. 4 W., in a cultivated field:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) heavy silty clay; weak fine angular blocky structure; very firm, very hard dry; common roots; medium acid; abrupt smooth boundary.

A12—8 to 12 inches; very dark grayish brown (10YR 3/2) heavy silty clay; weak fine angular blocky structure; very firm; few very dark gray (10YR 3/1) organic coatings on faces of peds; many roots; slightly acid; abrupt smooth boundary.

B21—12 to 16 inches; grayish brown (2.5Y 5/2) clay; many medium faint dark yellowish brown (10YR 4/4) mottles; moderate medium prismatic structure parting to moderate fine angular blocky; very firm; very dark gray (10YR 3/1) and dark grayish brown (10YR 4/2) organic coatings on faces of peds; common roots; neutral; clear smooth boundary.

B22—16 to 27 inches; grayish brown (2.5Y 5/2) clay; many medium faint dark yellowish brown (10YR 4/4) mottles; moderate medium prismatic structure parting to strong fine and medium angular blocky; very firm; dark gray (10YR 4/1) coatings on faces of peds; common roots; neutral; gradual smooth boundary.

B23—27 to 33 inches; dark grayish brown (10YR 4/2) (50 percent) and dark yellowish brown (10YR 4/4) (50 percent) silty clay; moderate medium prismatic structure parting to strong medium angular blocky; very firm; dark grayish brown (10YR 4/2) coatings on faces of peds; common roots; neutral; clear smooth boundary.

B24—33 to 36 inches; dark grayish brown (10YR 4/2) heavy clay loam; common medium faint dark yellowish brown (10YR 4/4) and few medium distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure; firm; dark grayish brown (10YR 4/2) coatings on faces of peds; common roots; neutral; abrupt smooth boundary.

IIB31—36 to 40 inches; grayish brown (10YR 5/2) (60 percent) and dark yellowish brown (10YR 3/4) (40 percent) loam; moderate coarse prismatic structure; friable; dark grayish brown (10YR 4/2) coatings on faces of peds; common roots and flakes of mica; slightly acid; clear smooth boundary.

IIB32—40 to 45 inches; grayish brown (10YR 5/2) and brown (10YR 5/3) light very fine sandy loam; common medium distinct dark yellowish brown (10YR 3/4) mottles; weak coarse prismatic structure; very friable; patchy dark grayish brown (10YR 4/2) coatings on vertical faces of peds; common roots and flakes of mica; slightly acid; gradual smooth boundary.

IIC—45 to 60 inches; grayish brown (10YR 5/2) loamy very fine sand; common fine faint brown (10YR 5/3) and common fine distinct dark yellowish brown (10YR 4/4) mottles; massive; very friable; few roots; saturated with water; common flakes of mica; medium acid.

Depth to the loamy IIB3 horizon ranges from about 26 to 40 inches, and depth to the more sandy IIC horizon ranges from 40 to 60 inches. The B horizon ranges from slightly acid to mildly alkaline. The IIC horizon commonly is loamy very fine sand, but can also be loamy fine sand or fine sand. Some pedons have lenses of very fine sandy loam, loam, and clay loam.

Camden Series

The Camden series consists of well drained and moderately well drained, moderately permeable soils that formed in loess or silty material and the underlying loamy sediments. Camden soils are on plains, ridges, and side slopes of terraces. Slopes range from 0 to 18 percent.

Camden soils are on the same landscape as Alvin, Starks, and St. Charles soils. Camden soils have less sand in the solum than Alvin soils and more sand than St. Charles soils. They have browner colors in the solum than Starks soils.

Typical pedon of Camden silt loam, 0 to 3 percent slopes, approximately 826 feet north and 1,433 feet west of center of sec. 6, T. 9 S., R. 1 W., in meadow:

Ap—0 to 9 inches; dark brown (10YR 4/3) silt loam; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

B1—9 to 14 inches; strong brown (7.5YR 5/6) light silty clay loam; moderate fine and medium subangular blocky structure; friable; patchy thin brown (7.5YR 4/4) clay films on faces of peds; common fine dark concretions (iron and manganese oxides); slightly acid; clear smooth boundary.

B21t—14 to 21 inches; strong brown (7.5YR 5/6) silty clay loam; moderate and strong medium subangular blocky structure; firm; continuous thin and medium brown (7.5YR 4/4) clay films on faces of peds; common fine dark concretions (iron and manganese oxides); medium acid; clear smooth boundary.

B22t—21 to 36 inches; strong brown (7.5YR 5/6) silty clay loam; strong moderate and coarse subangular blocky structure; firm; continuous medium brown (7.5YR 4/4) clay films on faces of peds; common fine concretions (iron and manganese oxides); strongly acid; clear smooth boundary.

IIB23t—36 to 46 inches; strong brown (7.5YR 5/6) clay loam; few medium distinct yellowish brown (10YR 5/6) and brown (10YR 5/3) mottles; moderate and strong medium and coarse subangular blocky structure; firm; continuous medium brown (7.5YR 4/4) clay films on faces of peds; common fine dark concretions (iron and manganese oxides); strongly acid; clear smooth boundary.

IIB24t—46 to 56 inches; strong brown (7.5YR 5/6) and yellowish brown (10YR 5/4) heavy fine sandy loam; few medium faint yellowish brown (10YR 5/4) and brown (10YR 5/3) mottles; moderate medium and coarse subangular blocky structure; friable; continuous thin and medium dark yellowish brown (10YR 4/4) clay films on faces of peds; common fine dark concretions (iron and manganese oxides); medium acid; clear smooth boundary.

IIB3—56 to 65 inches; strong brown (7.5YR 5/6) and yellowish brown (10YR 5/4) fine sandy loam; weak coarse subangular blocky structure; friable; patchy thin brown (7.5YR 4/4) clay films on faces of peds; medium acid; gradual smooth boundary.

IIC—65 to 76 inches; strong brown (7.5YR 5/6) and yellowish brown (10YR 5/4) loamy fine sand; single grained; very friable; medium acid.

Depth to loamy material is about 24 to 40 inches. Reaction of the B horizon ranges from slightly acid to strongly acid in the upper part and medium acid to slightly acid in the lower part. The lower part of the B horizon can be clay loam and loam, and the C horizon can be fine sandy loam and loam and commonly contains thin strata of finer material.

Coffeen Series

The Coffeen series consists of somewhat poorly drained, moderately permeable soils that formed in silty stream sediments. Coffeen soils are on alluvial fans of local streams that flow out from the bluff area along the Mississippi River bottom land. Slopes range from 0 to 2 percent.

Coffeen soils are on the same landscape as Raddle, Wakeland, and Haymond soils. Coffeen soils have grayer colors in the solum than Raddle and Haymond soils and have a darker A horizon than Wakeland and Haymond soils.

Typical pedon of Coffeen silt loam, approximately 70 feet north and 45 feet east of the southwest corner of sec. 5, T. 10 S., R. 3 W., in a cultivated field:

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam; friable; mildly alkaline; abrupt smooth boundary.

A12—9 to 17 inches; very dark grayish brown (10YR 3/2), very dark brown (10YR 2/2), and dark brown (10YR 4/3) silt loam; weak fine subangular blocky structure parting to weak coarse granular; friable; neutral; clear smooth boundary.

B1—17 to 21 inches; dark brown (10YR 4/3) and brown (10YR 5/3) silt loam; many medium distinct grayish brown (10YR 5/2) mottles; weak fine and medium subangular blocky structure; friable; neutral; clear smooth boundary.

B21—21 to 33 inches; grayish brown (10YR 5/2) and brown (10YR 5/3) silt loam; common medium distinct yellowish brown (10YR 5/4) mottles; weak and moderate medium and coarse subangular blocky structure; neutral; clear smooth boundary.

B22—33 to 48 inches; brown (10YR 5/3) and grayish brown (10YR 5/2) silt loam with thin loam strata; common medium distinct yellowish brown (10YR 5/4) mottles; weak and moderate medium and coarse subangular blocky structure; friable; common thin light gray (10YR 7/2) uncoated silt grains on faces of peds; few dark linings in worm holes; neutral; gradual smooth boundary.

B3—48 to 64 inches; yellowish brown (10YR 5/4) and grayish brown (10YR 5/2) silt loam; few medium distinct strong brown (7.5YR 5/6) and common medium faint yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; friable; continuous light gray (10YR 7/2) uncoated silt grains on vertical faces of peds; neutral; gradual smooth boundary.

C—64 to 76 inches; brown (10YR 5/3) and grayish brown (10YR 5/2) silt loam; massive; patchy thin light gray (10YR 7/2) streaks of uncoated silt grains; friable; neutral.

The A horizon ranges from 10 to about 20 inches in thickness. The solum is predominantly silt loam, but strata of silty clay loam and loam are in the lower part of the B horizon and in the C horizon of some pedons. The B horizon ranges from medium acid to neutral.

Colp Series

The Colp series consists of moderately well drained, slowly permeable soils that formed in thin layers of loess or silty sediments and clayey lacustrine sediments. Colp soils are on plains, ridges, and side slopes of terraces. Slopes are commonly 0 to 15 percent but range from 0 to 20 percent.

Colp soils are on the same landscape as Hurst and St. Charles soils. They have browner colors in the upper part of the solum than Hurst soils. They have more clay in the B2t horizon than St. Charles soils.

Typical pedon of Colp silt loam, 0 to 3 percent slopes, approximately 1,500 feet north and 2,600 feet west of the southeast corner of sec. 34, T. 7 S., R. 1 W., in a cultivated field:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable; many roots; mildly alkaline; abrupt smooth boundary.

A2—7 to 12 inches; light brownish gray (10YR 6/2) silt loam; moderate medium granular structure; friable; mildly alkaline; clear smooth boundary.

B1—12 to 16 inches; light brownish gray (10YR 6/2) and yellowish brown (10YR 5/4) light silty clay loam; common medium faint yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; firm; continuous light brownish gray (10YR 6/2) uncoated silt grains on faces of peds; very strongly acid; clear smooth boundary.

IIB21t—16 to 19 inches; yellowish brown (10YR 5/4) silty clay; few medium distinct light brownish gray (10YR 6/2) and common medium faint yellowish brown (10YR 5/6) mottles; moderate fine angular blocky structure; very firm; continuous brown (10YR 5/3) clay films and patchy light brownish gray (10YR 6/2) uncoated silt grains on faces of peds; extremely acid; clear smooth boundary.

IIB22t—19 to 45 inches; yellowish brown (10YR 5/4) silty clay; common medium distinct light brownish gray (10YR 6/2) and common medium faint yellowish brown (10YR 5/6) mottles; moderate fine angular blocky structure; very firm; continuous brown (10YR 5/3) clay films on faces of peds; extremely acid; clear smooth boundary.

IIB3—45 to 60 inches; light brownish gray (2.5Y 6/2) silty clay; common medium distinct brown (10YR 4/3), yellowish brown (10YR 5/6), and yellow (10YR 7/6) mottles; weak medium angular blocky structure; very firm; few white (10YR 8/1) stains and accumulations; very strongly acid.

The silty cap is 8 to 20 inches thick. Where the cap is thinner, the B1 horizon does not occur. The IIB2t horizon is mainly silty clay but also can be heavy silty clay loam. The B horizon ranges from extremely acid to medium acid. The B3 and C horizons have strata of silty clay loam, silt loam, and loam in some pedons.

Darwin Series

The Darwin series consists of very poorly drained or poorly drained, very slowly permeable soils that formed in clayey slack-water sediments. Darwin soils are on flood plains of the Mississippi River and large streams in the county and in a few depressions in terrace areas. Slopes are commonly less than 1 percent but range from 0 to 2 percent.

Darwin, Booker, Karnak, and Jacob soils formed in similar material. Darwin soils have pedons similar to those of Booker, Karnak, and Jacob soils, but they have a thicker and darker A horizon than Karnak and Jacob soils and are less acid than Booker and Jacob soils.

Typical pedon of Darwin silty clay, approximately 2,619 feet south and 72 feet east of center of sec. 26, T. 8 S., R. 5 W., in a cultivated field:

Ap—0 to 7 inches; very dark gray (10YR 3/1) silty clay; moderate fine subangular and angular blocky structure; surface mulch of moderate fine and medium granular structure; very firm; neutral; abrupt smooth boundary.

A12—7 to 11 inches; very dark gray (10YR 3/1) silty clay; common fine distinct dark brown (7.5YR 3/2) mottles; moderate fine subangular and angular blocky structure; very firm; mildly alkaline; clear wavy boundary.

B21g—11 to 17 inches; dark gray (10YR 4/1) silty clay; common fine distinct dark yellowish brown (10YR 4/4) and few medium prominent dark brown (7.5YR 4/4) mottles; moderate medium prismatic structure parting to moderate fine and medium angular blocky; very firm; very dark gray (10YR 3/1) organic coatings on faces of peds; mildly alkaline; clear smooth boundary.

B22g—17 to 26 inches; dark gray (5Y 4/1) silty clay; many fine and medium prominent dark brown (7.5YR 4/4) mottles; moderate medium prismatic structure parting to moderate medium angular blocky structure; very firm; very dark gray (10YR 3/1) and dark gray (10YR 4/1) organic coatings on faces of peds; mildly alkaline; gradual smooth boundary.

B23g—26 to 38 inches; dark gray (5Y 4/1) clay; many medium and coarse prominent dark brown (7.5YR 4/4) mottles; weak coarse prismatic structure parting to weak medium and coarse angular blocky structure; very firm, plastic; dark gray (10YR 4/1), few very dark gray (10YR 3/1), organic coatings on faces of peds; slickensides; roots to 34 inches; neutral; clear smooth boundary.

B3g—38 to 48 inches; dark gray (5Y 4/1) clay; common to many fine and medium prominent dark brown (7.5YR 4/4) mottles; weak coarse prismatic structure and massive; very firm, plastic; few very dark gray (10YR 3/1) organic coatings; neutral; gradual smooth boundary.

C1g—48 to 56 inches; dark gray (N 4/) clay; common fine and medium prominent dark brown (7.5YR 4/4) mottles; massive; very firm, plastic; mildly alkaline; clear smooth boundary.

C2g—56 to 69 inches; dark gray (5Y 4/1) silty clay; many medium prominent dark brown (7.5YR 4/4) mottles; massive; very firm, plastic; neutral.

Thickness of the A horizon ranges from 10 to about 24 inches. The A horizon is heavy silty clay loam, silty clay, or clay, and the B horizon is silty clay or clay. The solum ranges from slightly acid to mildly alkaline.

The C horizon is dominantly silty clay or clay but also can be silty clay loam.

The frequently flooded mapping unit included with this series in this survey area is outside the range for the Darwin series because of stratification and the range in texture. These differences do not affect use and management.

Dupo Series

The Dupo series consists of somewhat poorly drained, moderately permeable to slowly permeable soils that formed in light colored silty sediments overlying dark colored clayey sediments. Dupo soils are on the flood plain of the Mississippi River and streams of the county where recent silty stream sediments have covered a dark colored clayey soil. Slopes range from 0 to 2 percent.

Dupo soils are commonly on the same landscape as Wakeland, Coffeen, Belknap, and Darwin soils. They contain more clay in the lower part of the solum than Wakeland, Coffeen, or Belknap soils and contain less clay in the upper part of the solum than Darwin soils.

Typical pedon of Dupo silt loam, approximately 620 feet south and 200 feet west of the northeast corner of sec. 18, T. 10 S., R. 3 W., in a cultivated field:

Ap—0 to 7 inches; dark brown (10YR 4/3) light silt loam; few fine faint yellowish brown (10YR 5/8) and grayish brown (10YR 5/2) mottles; weak fine granular structure; very friable; neutral; abrupt smooth boundary.

C1—7 to 15 inches; brown (10YR 5/3) light silt loam; many medium and coarse faint grayish brown (10YR 5/2) mottles; massive; very friable; common dark stains (iron and manganese oxides); mildly alkaline; clear smooth boundary.

C2—15 to 25 inches; grayish brown (10YR 5/2) light silt loam; many medium distinct yellowish brown (10YR 5/6) mottles; massive; very friable; many dark stains (iron and manganese oxides); bedding planes; mildly alkaline; clear smooth boundary.

C3—25 to 29 inches; dark gray (10YR 4/1) heavy silt loam; massive; friable; many dark stains (iron and manganese oxides); neutral; abrupt smooth boundary.

IIA1b—29 to 34 inches; very dark grayish brown (10YR 3/2) silty clay; moderate fine angular blocky structure; very firm; many large dark stains (iron and manganese oxides); neutral; gradual wavy boundary.

IIA12b—34 to 50 inches; very dark gray (10YR 3/1) clay; common medium distinct dark yellowish brown (10YR 4/4) mottles; strong fine angular blocky structure; very firm; many small concretions (iron and manganese oxides); neutral; clear smooth boundary.

IIBb—50 to 60 inches; dark gray (10YR 4/1) clay; common fine distinct yellowish brown (10YR 5/6) mottles; weak coarse angular blocky structure; very firm; neutral.

Depth to underlying Ab horizon ranges from 20 to 40 inches. Reaction of the C and Ab horizons ranges from medium acid to moderately alkaline. The Ab horizon can be heavy silty clay loam, silty clay, or clay.

Gorham Series

The Gorham series consists of poorly drained, moderately slowly permeable to moderately permeable soils that formed in moderately fine to coarse textured alluvial sediments. Gorham soils are on nearly level, low, undulating ridges of the Mississippi River flood plain. Slopes range from 0 to 2 percent.

Gorham soils have pedons similar to those of Cairo and Medway soils and are on the same landscape as those soils. They have less clay in the solum than Cairo soils and have more clay and grayer colors in the solum than Medway soils.

Typical pedon of Gorham silty clay loam, approximately 1,881 feet north and 1,617 feet east of the southwest corner of sec. 24, T. 9 S., R. 4 W., in a cultivated field:

Ap—0 to 6 inches; very dark gray (10YR 3/1) silty clay loam; weak very fine and fine granular structure; firm; common roots; mildly alkaline; abrupt smooth boundary.

A12—6 to 8 inches; very dark gray (10YR 3/1) silty clay loam; moderate medium angular blocky structure; very firm; few roots; mildly alkaline; abrupt smooth boundary.

A3—8 to 13 inches; very dark grayish brown (10YR 3/2) heavy silty clay loam; common fine distinct dark brown (7.5YR 4/4) mottles; moderate medium angular blocky structure parting to moderate fine blocky; very firm; few roots; continuous very dark gray (10YR 3/1) organic clay coatings on faces of peds; neutral; clear smooth boundary.

B21—13 to 26 inches; dark grayish brown (10YR 4/2) light silty clay; common fine distinct dark yellowish brown (10YR 4/4) mottles; weak medium prismatic structure parting to moderate fine and medium angular blocky; very firm; few roots; continuous dark gray (10YR 4/1) organic clay coatings on faces of peds; few small concretions (iron and manganese oxides); neutral; abrupt smooth boundary.

B22—26 to 30 inches; dark grayish brown (10YR 4/2) silty clay loam with some sand; many fine distinct dark yellowish brown (10YR 4/4) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; few roots; continuous dark gray (10YR 4/1) and some very dark gray (10YR 3/1) organic clay films on all faces of peds; few small concretions (iron and manganese oxides); slightly acid; gradual smooth boundary.

IIB23—30 to 34 inches; dark yellowish brown (10YR 3/4) clay loam; many medium distinct dark grayish brown (10YR 4/2) mottles; weak medium prismatic structure parting to moderate fine angular blocky; firm; few roots; continuous dark gray (10YR 4/1) and some very dark gray (10YR 3/1) organic clay coatings on all faces of peds and in root channels; neutral; gradual smooth boundary.

IIB31—34 to 39 inches; dark yellowish brown (10YR 3/4) sandy clay loam; many medium distinct grayish brown (2.5Y 5/2) mottles; weak medium prismatic structure parting to weak medium and coarse angular blocky; friable; few roots; dark gray (10YR 4/1) and some very dark gray (10YR 3/1) organic clay coatings continuous on vertical and discontinuous on horizontal faces of peds and in root channels; neutral; gradual smooth boundary.

IIB32—39 to 46 inches; grayish brown (2.5Y 5/2) sandy loam; many medium distinct dark yellowish brown (10YR 3/4) mottles; weak coarse angular blocky structure; very friable; few roots; very dark gray (10YR 3/1) organic clay coatings continuous on vertical and discontinuous on horizontal faces of peds and in root channels; few mica flecks; neutral; gradual smooth boundary.

IIB33—46 to 52 inches; very dark grayish brown (10YR 3/2) loamy fine sand; common medium distinct dark grayish brown (2.5Y 4/2) mottles and few medium faint dark yellowish brown (10YR 3/4) mottles; very weak coarse angular blocky structure; loose; discontinuous very dark gray (10YR 3/1) organic clay coatings on faces of peds and in root channels; few mica flecks; slightly acid; abrupt smooth boundary.

IIC1—52 to 56 inches; very dark grayish brown (10YR 3/2) stratified sandy loam and loamy fine sand; common fine distinct dark grayish brown (2.5Y 4/2) mottles; massive; very friable; slightly acid; abrupt smooth boundary.

IIC2—56 to 60 inches; yellowish brown (10YR 5/4) fine sand; common medium distinct grayish brown (2.5Y 5/2) mottles; single grained; loose; slightly acid.

The thickness of the A horizon ranges from 10 to 20 inches. The B2 horizon is predominantly silty clay loam, but it can be light silty clay in the upper part and ranges from clay loam to loamy fine sand in the lower part. The solum ranges from slightly acid to mildly alkaline.

Goss Series

The Goss series consists of well drained, moderately permeable soils that formed in residuum weathered from cherty limestone. Goss soils are on steep and very steep hillsides in the uplands. Slopes range from 25 to 65 percent.

Goss soils are on the same hillsides as Alford soils and have pedons similar to those of Neotoma soils. They have more clay in the B2t horizon than Alford and Neotoma soils and have chert fragments instead of the sandstone and siltstone fragments of Neotoma soils.

Typical pedon of Goss cherty silt loam, approximately 385 feet north and 1,875 feet west of southeast corner of sec. 27, T. 10 S., R. 3 W., in a wooded area:

A1—0 to 3 inches; very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2) cherty silt loam; friable; 20 to 30 percent small chert fragments; slightly acid; abrupt smooth boundary.

A21—3 to 10 inches; brown (10YR 5/3) very cherty silt loam; friable; surfaces of chert fragments reddish yellow (7.5YR 6/8); 60 percent chert fragments; medium acid; clear smooth boundary.

A22—10 to 23 inches; light brown (7.5YR 6/4) very cherty silt loam; friable; 80 percent chert fragments; slightly acid; abrupt irregular boundary.

B21t—23 to 28 inches; yellowish red (5YR 5/6) and light brown (7.5YR 6/4) very cherty clay; weak fine and medium angular blocky structure in interstices; very firm; 70 percent chert fragments; strongly acid; clear irregular boundary.

B22t—28 to 43 inches; red (2.5YR 4/6) very cherty clay; weak fine and medium angular blocky structure in interstices; very firm; 75 percent chert fragments; streaks of brownish yellow (10YR 6/8); medium acid; clear irregular boundary.

B23t—43 to 53 inches; red (2.5YR 4/6) and reddish yellow (7.5YR 6/6) very cherty clay; weak fine and medium angular blocky structure; very firm; 55 to 65 percent chert fragments; streaks of light gray (2.5Y 7/2); medium acid; clear irregular boundary.

B24t—53 to 60 inches; red (2.5YR 4/6) very cherty clay; weak fine and medium angular blocky structure; firm; 60 to 70 percent chert fragments; splotches of red (2.5YR 4/6) on chert surfaces; medium acid.

The solum ranges from about 4 feet to more than 10 feet in thickness. The B horizon is very cherty clay, silty clay, or heavy silty clay loam. Coarse fragments range from 50 to 80 percent. The solum is strongly acid to slightly acid.

Haymond Series

The Haymond series consists of well drained, moderately permeable soils that formed in silty alluvium. Haymond soils are on flood plains and alluvial fans along streams. Slope ranges from 0 to 2 percent.

Haymond soils are on bottom lands with Wakeland and Burnside soils. They are near Raddle soils. Haymond soils are better drained and have browner colors to a greater depth than the somewhat poorly drained Wakeland soils. They lack the gravelly or stony layers within a depth of 40 inches that are evident in Burnside soils. Haymond soils have less clay and a lighter colored surface layer than Raddle soils, which formed in colluvium.

Typical pedon of Haymond silt loam, approximately 1,155 feet east and 165 feet south of the center of sec. 34, T. 8 S., R. 4 W., in a cultivated field:

Ap—0 to 8 inches; brown (10YR 4/3) light silt loam; weak fine granular structure; very friable; slightly acid; abrupt smooth boundary.

C1—8 to 16 inches; brown (10YR 4/3) light silt loam; very weak fine granular structure to massive; very friable; neutral; clear smooth boundary.

C2—16 to 32 inches; dark yellowish brown (10YR 3/4) light silt loam; very weak fine granular structure to massive; very friable; neutral; gradual wavy boundary.

C3—32 to 60 inches; brown (10YR 4/3) light silt loam; massive; very friable; neutral.

Reaction ranges from medium acid to neutral in the control section. Few to common grayish mottles occur in the lower part of many pedons. Loamy layers, which commonly contain some gravel and stones, are in some pedons below a depth of 40 inches.

Hickory Series

The Hickory series consists of moderately well drained and well drained, moderately permeable soils that formed in glacial drift. Hickory soils are on hillsides along drainageways or above bottom lands. Slopes range from 7 to 50 percent and are predominantly 12 to 30 percent.

Hickory soils are commonly on the same hillsides as Alford, Wellston, Hosmer, and Ava soils. Hickory soils are associated with Wellston soils. Hickory soils have more sand in the solum than Alford, Hosmer, and Ava soils and lack the dense, compact subsoil of Hosmer and Ava soils. They contain fewer coarse fragments in the lower part of the solum and are deeper to bedrock than Wellston soils.

Typical pedon of Hickory silt loam, 18 to 30 percent slopes, 999 feet south and 1,533 feet west of the northeast corner of sec. 24, T. 7 S., R. 4 W., in a wooded area:

A1—0 to 2 inches; dark grayish brown (10YR 4/2) light silt loam; weak fine granular structure; friable; strongly acid; clear smooth boundary.

A2—2 to 5 inches; brown (10YR 5/3) light silt loam; moderate very thin platy structure; friable; extremely acid; clear smooth boundary.

B1—5 to 8 inches; yellowish brown (10YR 5/6) heavy silt loam; moderate very fine subangular blocky structure; friable; extremely acid; clear smooth boundary.

B21t—8 to 18 inches; yellowish brown (10YR 5/6) light clay loam; moderate fine subangular blocky structure; firm; continuous dark brown (7.5YR 4/4) clay films and light yellowish brown (10YR 6/4) uncoated silt grains on faces of peds; few dark oxide stains, mainly on ped surfaces; extremely acid; gradual smooth boundary.

B22t—18 to 27 inches; strong brown (7.5YR 5/6) clay loam; few medium distinct yellowish red (5YR 5/6) and yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; firm; continuous dark brown (7.5YR 4/4) clay films and patchy very pale brown (10YR 7/3) uncoated silt grains on faces of peds; few dark oxide stains, mainly on faces of peds; very strongly acid; gradual smooth boundary.

B23t—27 to 39 inches; yellowish brown (10YR 5/6) clay loam; common medium distinct pale brown (10YR 6/3) mottles; moderate medium and coarse subangular blocky structure; very hard dry, firm moist; continuous dark brown (7.5YR 4/4) clay films and patchy very pale brown (10YR 7/3) uncoated silt grains on faces of peds; common dark oxide stains, mainly on vertical faces of peds; medium acid; clear smooth boundary.

B24t—39 to 47 inches; pale brown (10YR 6/3) clay loam; common medium distinct strong brown (7.5YR 5/8) mottles; moderate medium prismatic structure; very hard dry, firm moist; continuous dark brown (7.5YR 4/4) clay films on faces of peds; common dark oxide stains, mainly on vertical surfaces of peds; slightly acid; clear smooth boundary.

B3t—47 to 56 inches; yellowish brown (10YR 5/8) light clay loam; few fine distinct light brownish gray (2.5Y 6/2) and common medium

and coarse distinct pale brown (10YR 6/3) mottles; weak medium and coarse prismatic structure; very hard dry, firm moist; discontinuous dark brown (7.5YR 4/4) clay films on faces of peds; neutral; clear smooth boundary.

C—56 to 62 inches; pale brown (10YR 6/3) loam; common medium distinct yellowish brown (10YR 5/6) mottles; very hard dry, firm moist; neutral.

Texture of the A horizon is typically silt loam but can be loam. The A horizon ranges from 5 to 12 inches in thickness in uncultivated areas. The upper part of the B horizon is commonly silty clay loam in areas where the layers of loess are thick. The B horizon contains varying amounts of pebbles and sand and is loam or clay loam. Some pedons have grayish mottles in the lower part of the B horizon. Free carbonates occur at a depth of 60 inches to more than 90 inches.

Hosmer Series

The Hosmer series consists of moderately well drained, moderately permeable to very slowly permeable soils that formed in loess. Hosmer soils are on ridgetops, side slopes, and foot slopes of the uplands. Slopes are commonly 2 to 12 percent but range from 2 to 18 percent.

Hosmer soils are on the same landscape as Stoy, Hickory, and Alford soils and have pedons similar to those of Ava soils. They have browner colors in the upper part of the solum than Stoy soils. They contain less sand than Hickory soils and have a Bx horizon, which is lacking in both Alford and Hickory soils. Hosmer soils formed in Peoria loess, whereas Ava soils formed in Peoria loess and the underlying loamy material.

Typical pedon of Hosmer silt loam, 2 to 7 percent slopes, approximately 72 feet south and 990 feet west of the center of sec. 22, T. 9 S., R. 2 W., in a meadow:

Ap—0 to 9 inches; brown (10YR 4/3) silt loam; weak very fine and fine granular structure; friable; slightly acid; abrupt smooth boundary.

B1t—9 to 12 inches; strong brown (7.5YR 5/6) heavy silt loam; weak very fine and fine subangular blocky structure; friable; dark brown (10YR 4/3) clay films on faces of peds; strongly acid; clear smooth boundary.

B21t—12 to 20 inches; strong brown (7.5YR 5/6) light silty clay loam; moderate fine subangular blocky structure; firm; dark yellowish brown (10YR 4/4) clay films on faces of peds; strongly acid; clear smooth boundary.

B22t—20 to 23 inches; yellowish brown (10YR 5/6) heavy silt loam; common fine distinct pale brown (10YR 6/3) and common fine faint yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; firm; yellowish brown (10YR 5/4) clay films on faces of peds; few fine dark concretions; very strongly acid; abrupt smooth boundary.

B&A—23 to 25 inches; yellowish brown (10YR 5/4) heavy silt loam (B2t), pale brown (10YR 6/3) silt loam (A2); common medium distinct strong brown (7.5YR 5/6) and prominent yellowish red (5YR 5/6) mottles; weak fine subangular blocky structure; friable; very strongly acid; abrupt smooth boundary.

Bx1—25 to 33 inches; dark yellowish brown (10YR 4/4) and light brownish gray (10YR 6/2) silty clay loam; common medium and coarse prominent strong brown (7.5YR 5/8) mottles; weak medium prismatic structure parting to moderate medium and coarse subangular blocky; firm and slightly brittle; brown (10YR 5/3) and dark yellowish brown (10YR 4/4) clay films on faces of peds; common fine dark concretions; very strongly acid; gradual smooth boundary.

Bx2—33 to 42 inches; yellowish brown (10YR 5/6) and dark yellowish brown (10YR 4/4) light silty clay loam; common fine and medium distinct light brownish gray (10YR 6/2) and strong brown (7.5YR 5/8) mottles; weak and moderate medium and coarse subangular blocky structure; very firm and brittle; patchy dark yellowish brown (10YR 4/4) clay films on faces of peds; common fine dark concretions; very strongly acid; clear smooth boundary.

Bx3—42 to 50 inches; dark yellowish brown (10YR 4/4) and pale brown (10YR 6/3) silt loam; weak coarse subangular blocky structure; firm and brittle; patchy dark yellowish brown (10YR 4/4) clay films and scattered light brownish gray (10YR 6/2) coatings on faces of peds; common fine dark concretions; very strongly acid; gradual smooth boundary.

Cx—50 to 67 inches; yellowish brown (10YR 5/6) and pale brown (10YR 6/3) silt loam; few fine faint strong brown (7.5YR 5/6) mottles; massive; firm and slightly brittle; streaks of grayish brown (10YR 5/2); common fine dark concretions and stains; very strongly acid.

Depth to the dense, compact Bx horizon ranges from 24 to 36 inches. The B2t horizon is heavy silt loam or silty clay loam. Some pedons in the more sloping areas have no thin B&A horizon. Reaction of the B horizon ranges from strongly acid to very strongly acid.

Hoyleton Series

The Hoyleton series consists of somewhat poorly drained, slowly permeable soils that formed in loess and the underlying loamy material. Hoyleton soils are on drainage divides, ridges, and side slopes along drainageways of till plains. Slopes range from 0 to 6 percent.

Hoyleton soils are on the same landscape as Bluford, Ava, and Wynoose soils. They have a thicker and darker A1 or Ap horizon than those soils, have grayer colors and more clay in the B2t horizon than Ava soils, and are less gray than Wynoose soils.

Typical pedon of Hoyleton silt loam, 0 to 3 percent slopes, approximately 971 feet north and 102 feet east of the southwest corner of sec. 7, T. 7 S., R. 1 W., in a cultivated field:

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam; moderate fine granular structure; friable; common roots; few dark concretions; neutral; abrupt smooth boundary.

A21—9 to 16 inches; pale brown (10YR 6/3) silt loam; many medium faint brownish yellow (10YR 6/6) and few medium prominent yellowish red (5YR 5/8) mottles; weak medium granular structure; friable; few roots; common dark concretions; brown (10YR 5/3) coatings along root channels; extremely acid; clear smooth boundary.

A22—16 to 19 inches; light yellowish brown (10YR 6/4) heavy silt loam; many medium prominent yellowish red (5YR 5/8) mottles; weak fine subangular blocky structure; friable; brown (10YR 5/3) films and light gray (10YR 7/2) uncoated silt grains on faces of peds; extremely acid; abrupt smooth boundary.

B&A—19 to 23 inches; red (2.5YR 4/8) and brown (10YR 5/3) silty clay (B2t), grayish brown (10YR 5/2) heavy silt loam (A2); strong fine angular blocky structure; very firm; white (10YR 8/1 dry) uncoated silt grains on vertical faces of peds; very strongly acid; clear smooth boundary.

B21t—23 to 34 inches; grayish brown (10YR 5/2) heavy silty clay loam; many medium distinct strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate coarse subangular blocky; very firm; continuous grayish brown (10YR 5/2) clay films and patchy white (10YR 8/1) uncoated silt grains on vertical faces of peds; very strongly acid; gradual smooth boundary.

B22t—34 to 46 inches; grayish brown (10YR 5/2) silty clay loam; many medium distinct strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to weak coarse subangular blocky; firm; continuous grayish brown (10YR 5/2) clay films on vertical faces of peds; strongly acid; clear smooth boundary.

IIB3t—46 to 60 inches; yellowish brown (10YR 5/4) silt loam; many fine and medium distinct light brownish gray (10YR 6/2) and common

fine distinct strong brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; patchy brown (10YR 5/3) clay films on vertical faces of peds; slightly acid.

The Ap or A1 horizon is commonly 7 to 9 inches thick. The upper part of the B2t horizon, the most clayey part, is heavy silty clay loam or light silty clay. The reddish mottles are few or do not occur in some pedons.

Hurst Series

The Hurst series consists of somewhat poorly drained, very slowly permeable soils that formed in thin layers of loess or silty sediments and the underlying clayey lacustrine sediments. Hurst soils are on plains, ridges, and side slopes of drainageways on terraces along the major streams of the county. Slopes are mainly 0 to 2 percent but range from 0 to 6 percent.

Hurst soils generally occur with St. Charles, Okaw, Starks, and Colp soils. They have more clay in the B2t horizon than St. Charles or Starks soils, are more gray than St. Charles and Colp soils, and are less gray than Okaw soils.

Typical pedon of Hurst silt loam, 0 to 2 percent slopes, 656 feet north and 2,340 feet west of the southeast corner of sec. 29, T. 7 S., R. 2 W., in a cultivated field:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam; splotches of light brownish gray (10YR 6/2); weak fine granular structure; friable; common fine and medium concretions (iron and manganese oxides); neutral; abrupt smooth boundary.

A21—10 to 16 inches; light gray (10YR 7/2) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak and moderate thin platy structure parting to weak fine granular; friable; common fine and medium concretions (iron and manganese oxides); very strongly acid; abrupt smooth boundary.

A22—16 to 20 inches; light brownish gray (10YR 6/2) light silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to moderate very fine and fine angular and subangular blocky; firm; grayish brown (10YR 5/2) films on faces of peds; light gray (10YR 7/2) coatings on faces of peds; common fine concretions (iron and manganese oxides); extremely acid; clear smooth boundary.

IIB21t—20 to 24 inches; brown (10YR 5/3) silty clay; common fine distinct yellowish brown (10YR 5/6) mottles; moderate fine prismatic structure parting to moderate fine angular blocky; very firm; grayish brown (10YR 5/2) clay films on faces of peds; light gray (10YR 7/2) uncoated silt grains on faces of peds; common fine concretions (iron and manganese oxides); extremely acid; clear smooth boundary.

IIB22t—24 to 34 inches; brown (10YR 5/3) silty clay; common fine and medium distinct yellowish brown (10YR 5/6 and 5/8) mottles; moderate fine and medium prismatic structure parting to moderate fine and medium angular and subangular blocky; very firm; grayish brown (10YR 5/2) clay films on faces of peds; common fine concretions (iron and manganese oxides); extremely acid; clear smooth boundary.

IIB23t—34 to 43 inches; grayish brown (10YR 5/2) heavy silty clay; common fine and medium yellowish brown (10YR 5/8) mottles; moderate medium and coarse prismatic structure parting to weak medium angular blocky; very firm; grayish brown (10YR 5/2) clay films on faces of peds; common fine and medium concretions (iron and manganese oxides); extremely acid; clear smooth boundary.

IIB24t—43 to 54 inches; grayish brown (10YR 5/2) heavy silty clay loam; many medium and coarse distinct yellowish brown (10YR 5/6 and 5/8) mottles; weak coarse prismatic structure parting to weak medium and coarse angular blocky; firm; grayish brown (10YR 5/2) clay films on faces of peds; many fine and medium concretions (iron and manganese oxides); strongly acid; clear smooth boundary.

IIB3t—54 to 61 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine and medium prominent strong brown (7.5YR 5/6) and common fine distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to weak coarse angular blocky; firm; grayish brown (2.5Y 5/2) films on faces of peds; many fine and medium concretions and few stains and root channel fillings (iron and manganese oxides); medium acid; gradual smooth boundary.

IIC—61 to 65 inches; grayish brown (2.5Y 5/2) and light grayish brown (2.5Y 6/2) light silty clay; many medium and coarse prominent strong brown (7.5YR 5/6) mottles; massive; firm; few grayish brown (2.5Y 5/2) coatings; many dark stains and channel fillings (iron and manganese oxides); medium acid.

The silty mantle is 12 to 24 inches thick. Where the mantle is thin, the B1 horizon commonly does not occur. The B2t horizon includes heavy silty clay loam, and the C horizon includes silty clay loam and strata of silt loam. Reaction of the C horizon ranges from strongly acid to mildly alkaline. This horizon contains carbonates in some pedons.

Jacob Series

The Jacob series consists of very poorly drained and poorly drained, very slowly permeable soils that formed in clayey slack-water sediments. Jacob soils are on broad flats and narrow depressions of flood plains and on low-lying bench terraces along the major streams. Slopes are commonly less than 1 percent but range from 0 to 2 percent.

Jacob soils have pedons similar to those of Booker, Karnak, Piopolis, and Okaw soils and occur near those soils. Jacob soils are more acid than Karnak soils, have more clay in the solum than Piopolis soils, have a thinner and lighter colored A horizon than Booker soils, and lack the more silty A1 and A2 horizons of Okaw soils.

Typical pedon of Jacob clay, approximately 50 feet north and 1,600 feet east of the southwest corner of sec. 22, T. 10 S., R. 3 W., in a wooded area:

A1—0 to 4 inches; dark gray (10YR 4/1) clay; common fine faint gray (10YR 5/1) mottles; moderate medium granular structure; very firm; slightly acid; clear wavy boundary.

B21g—4 to 16 inches; gray (10YR 5/1) clay; few fine distinct olive brown (2.5Y 4/4) mottles; weak fine angular blocky structure; very firm, very plastic; very strongly acid; gradual wavy boundary.

B22g—16 to 34 inches; gray (5Y 5/1) clay; common fine distinct light olive brown (2.5Y 5/4) mottles; weak fine angular blocky structure; very firm, very plastic; very strongly acid; gradual wavy boundary.

B3g—34 to 50 inches; olive gray (5Y 5/2) clay; weak fine angular blocky structure in upper part and massive in lower part; very plastic; very strongly acid; gradual wavy boundary.

Cg—50 to 60 inches; grayish brown (2.5Y 5/2) clay; many fine faint light olive brown (2.5Y 5/4) mottles; massive; dark grayish brown (2.5Y 4/2) coatings on pressure faces; common dark accumulations (iron and manganese oxides) in nodules and along slickensides; very firm; slightly acid.

The B2g horizon ranges from strongly acid to extremely acid and is silty clay or clay. Clay content is commonly 60 to 75 percent but ranges from 50 to 80 percent. The C horizon is silty clay or clay, but thin strata of silty clay loam are in some pedons.

Karnak Series

The Karnak series consists of very poorly drained and poorly drained, very slowly permeable soils that formed in clayey slack-water sediments. Karnak soils are on broad flats and narrow depressions of flood plains along

the major streams. Slopes are commonly less than 1 percent but range from 0 to 2 percent.

Karnak, Jacob, Booker, Darwin, and Cairo soils formed in similar material. Karnak soils have pedons similar to those of Jacob, Booker, Darwin, and Cairo soils. They are less acid in the solum than Jacob soils. They have a thinner and lighter colored A horizon than Booker, Darwin, and Cairo soils and lack the loamy substratum within a 40-inch depth that is characteristic of Cairo soils.

Typical pedon of Karnak silty clay, approximately 27 feet north and 690 feet east of the center of sec. 2, T. 9 S., R. 5 W., in a cultivated field:

Ap1—0 to 3 inches; very dark gray (10YR 3/1) silty clay; moderate fine granular structure; very firm; neutral; abrupt smooth boundary.

Ap2—3 to 6 inches; very dark gray (10YR 3/1) silty clay; weak fine angular blocky structure and massive; very firm; slightly acid; abrupt smooth boundary.

B21g—6 to 17 inches; dark gray (10YR 4/1) clay; common medium distinct dark brown (7.5YR 4/4) mottles; moderate medium prismatic structure parting to moderate fine angular blocky; extremely firm; medium acid; clear smooth boundary.

B22g—17 to 38 inches; gray (5Y 5/1) clay; many medium and coarse prominent yellowish red (5YR 4/6) streaks and stains; moderate medium prismatic structure parting to weak fine angular blocky; extremely firm; strongly acid; clear smooth boundary.

B3g—38 to 54 inches; gray (5Y 5/1) clay; common medium prominent yellowish brown (10YR 5/6) mottles; weak coarse angular blocky structure; extremely firm; dark stains and concretions; slightly acid; abrupt smooth boundary.

Cg—54 to 60 inches; gray (5Y 5/1) light silty clay loam; common medium prominent strong brown (7.5YR 5/6) mottles; massive; firm; slightly acid.

The A and B horizons are silty clay or clay. The Bg horizon is mainly slightly acid or medium acid but can also be strongly acid. The C horizon includes silty clay loam, and some pedons have lenses of coarser material.

Medway Series

The Medway series consists of somewhat poorly drained, moderately permeable soils that formed in silty and loamy alluvium. Medway soils are on undulating, narrow to broad ridges and natural levees along sloughs or overflow channels of the Mississippi River flood plains. Slopes are commonly 0 to 3 percent, but some short slopes range to about 6 percent.

Medway soils are on the same flood plains as Ware, Gorham, Cairo, and Bowdre soils. Medway soils contain more clay than Ware soils and less clay than Bowdre soils. They contain less clay and are not so deep to loamy or sandy layers as Gorham and Cairo soils.

Typical pedon of Medway silty clay loam, approximately 985 feet north and 2,208 feet east of the center of sec. 11, T. 9 S., R. 5 W., in a cultivated field:

Ap—0 to 8 inches; very dark brown (10YR 2/2) silty clay loam; massive; firm; medium acid; abrupt smooth boundary.

A12—8 to 17 inches; very dark brown (10YR 2/2) and dark brown (10YR 3/3) silty clay loam; moderate medium subangular blocky structure; firm; slightly acid; clear smooth boundary.

B21—17 to 27 inches; dark brown (10YR 4/3) heavy loam; few fine distinct light brownish gray (10YR 6/2) mottles; moderate medium and coarse subangular blocky structure; friable; patchy very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear smooth boundary.

B22—27 to 36 inches; dark brown (10YR 4/3) loam; common medium distinct grayish brown (10YR 5/2) mottles; weak medium and coarse subangular blocky structure; friable; patchy very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear smooth boundary.

C—36 to 61 inches; brown (10YR 5/3) and pale brown (10YR 6/3) very fine sandy loam; common medium distinct light brownish gray (10YR 6/2) and common fine faint yellowish brown (10YR 5/4) mottles; massive; very friable; neutral.

Depth to the loamy material ranges from 15 to 30 inches. The A horizon is silty clay loam, clay loam, or silt loam. The B2 horizon can be silt loam or clay loam and ranges from slightly acid to mildly alkaline. Strata of loamy very fine sand, loamy fine sand, fine sand, and very fine sand are in the C horizon of some pedons.

Neotoma Series

The Neotoma series consists of well drained, moderately permeable to moderately rapidly permeable soils that formed in thin deposits of loess or silty colluvium and residuum that weathered from sandstone, siltstone, and shale bedrock. Neotoma soils are on steep and very steep hillsides in the uplands (fig. 14). Slopes are commonly 30 to 50 percent but range from 18 to 55 percent.

Neotoma soils occur on the same hillsides as Wellston soils but have more coarse fragments throughout the solum than those soils.

Typical pedon of Neotoma stony loam, in an area of Neotoma-Rock land complex, 25 to 55 percent slopes, approximately 458 feet north and 561 feet east of the southeast corner of sec. 12, T. 10 S., R. 2 W., in a wooded area:

A1—0 to 2 inches; very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2) stony loam; weak fine granular structure; friable; 70 percent coarse fragments; very strongly acid; clear smooth boundary.

A2—2 to 20 inches; brown (7.5YR 5/4) very cobbly light loam; weak fine and medium granular structure; friable; 60 percent coarse fragments; very strongly acid; clear wavy boundary.

B21t—20 to 24 inches; yellowish red (5YR 5/6) cobbly loam; weak and moderate very fine and fine subangular blocky structure; friable; patchy yellowish red (5YR 4/6) clay films; 30 percent coarse fragments; very strongly acid; clear smooth boundary.

B22t—24 to 30 inches; yellowish red (5YR 5/6) cobbly clay loam; moderate very fine and fine subangular blocky structure; firm; continuous yellowish red (5YR 4/6) clay films on faces of peds and surfaces of fragments; 40 percent coarse fragments; strongly acid; clear wavy boundary.

B23t—30 to 48 inches; yellowish red (5YR 5/6) very cobbly light clay loam; few medium distinct red (2.5YR 5/8) mottles; weak medium subangular blocky structure; firm; patchy yellowish red (5YR 4/6) clay films on faces of peds and surfaces of fragments; very gritty; 75 percent coarse fragments; very strongly acid; clear irregular boundary.

C—48 to 60 inches; mixed red (2.5YR 4/8), yellowish red (5YR 5/8), and strong brown (7.5YR 5/8) sandy clay loam; shows rock structure; firm; reddish brown (5YR 4/4) clay films on rock surfaces and along fractures; extremely acid.

Depth to consolidated bedrock ranges from 40 to 80 inches. The average content of coarse fragments ranges from 35 to 75 percent in the solum, but some part of the solum in many pedons is only 20 to 30 percent coarse fragments. Texture of the fine earth component of the B2t horizon ranges from sandy loam to silty clay loam. Reaction of the B2t horizon ranges from medium acid to extremely acid.

Okaw Series

The Okaw series consists of poorly drained and very poorly drained, slowly permeable to very slowly permeable soils that formed in thin layers of loess or silty sediments over clayey lacustrine sediments. Okaw soils are on nearly level plains or drainage divides of terraces. Slopes range from 0 to 2 percent.

Okaw soils are on the same landscape as Hurst, Starks, and Sexton soils. They have grayer colors in the B2t horizon than Hurst and Starks soils and have a greater increase in clay content between the A2 and B2t horizons than Sexton soils.

Typical pedon of Okaw silt loam, 624 feet west and 105 feet north of the southeast corner of sec. 8, T. 7 S., R. 2 W., in a cultivated field:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; moderate very fine and fine granular structure; friable; few fine and medium concretions (iron and manganese oxides); slightly acid; abrupt smooth boundary.

A21—7 to 11 inches; light brownish gray (10YR 6/2) silt loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; moderate thin platy structure parting to weak fine granular; friable; many fine pores; common fine and medium concretions (iron and manganese oxides); extremely acid; abrupt smooth boundary.

A22—11 to 15 inches; light brownish gray (10YR 6/2) heavy silt loam; common fine distinct yellowish brown (10YR 5/8) mottles; weak thin platy structure parting to weak fine granular; friable; many fine and medium concretions (iron and manganese oxides); many fine pores; very strongly acid; clear wavy boundary.

IIB21t—15 to 31 inches; grayish brown (10YR 5/2) silty clay; few fine and medium distinct yellowish brown (10YR 5/8) mottles; weak fine prismatic structure parting to weak fine angular blocky; very firm; grayish brown (10YR 5/2) clay films on faces of peds; common fine and medium concretions; light brownish gray (10YR 6/2) silty material in krotovina and along cracks; very strongly acid; clear smooth boundary.

IIB22t—31 to 41 inches; olive gray (5Y 5/2) silty clay; few fine and medium prominent yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to weak medium and coarse angular and subangular blocky; very firm; light brownish gray (10YR 6/2) silty material along cracks; common fine and medium concretions and stains (iron and manganese oxides); very strongly acid; gradual smooth boundary.

IIB3—41 to 54 inches; olive gray (5Y 5/2) light silty clay; common medium prominent yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure; very firm; few fine concretions and stains (iron and manganese oxides); strongly acid; clear smooth boundary.

IIC—54 to 63 inches; olive gray (5Y 5/2) silty clay; massive; firm; many concretions and stains (iron and manganese oxides); neutral.

Thickness of the loess or silty mantle ranges from 10 to 24 inches. The B2t horizon ranges from heavy silty clay loam to clay and commonly averages 42 to 50 percent clay. The solum normally is strongly acid to extremely acid but can be medium acid.

Orthents, Clayey

Orthents, clayey, are somewhat poorly drained to very poorly drained, very slowly permeable soils that formed in predominantly clayey sediments of the Mississippi and Big Muddy River flood plains. These soils are in depressions of borrow pits and on aprons, side slopes, and ridgetops of levees. Slopes range from 0 to 20 percent.

Orthents, clayey, differ from Darwin, Jacob, and other clayey soils of the flood plain in not having an orderly sequence of horizons. They are classified only by the kind of soil material. The soil material is mostly dark gray, mottled silty clay or clay to a depth of about 60 inches.

Orthents, clayey, range from 35 to 75 percent clay. Pedons in depressions commonly have thin silty or loamy strata. Reaction ranges from extremely acid to moderately alkaline.

Orthents, Loamy

Orthents, loamy, are well drained, moderately permeable soils that formed in material derived from glacial till with a component of loess and sandstone, shale, and some limestone bedrock. These soils are on side slopes and ridgetops and in depressions of spoil banks in strip-mine land. Slopes are mainly 30 to 60 percent but range from 2 to 70 percent.

Orthents, loamy, differ from Hickory, Neotoma, and other similar soils that formed in glacial till or residuum weathered from bedrock in lacking an orderly sequence of horizons. They are classified only by the kind of soil material. The soil material is mostly brown, mottled stony loam to a depth of about 60 inches.

The content of coarse fragments, primarily sandstone and shale, ranges from about 20 to 35 percent. The fine earth material is predominantly silty or loamy but ranges from loam to silty clay. Reaction is commonly slightly acid to neutral but ranges from extremely acid to moderately alkaline.

Orthents, Silty

Orthents, silty, are somewhat poorly drained and moderately well drained, moderately permeable to slowly permeable soils that formed in material derived mainly from loess or water-laid sediments. These soils are on the tops, in the depressions, and on the side slopes of cut and fill areas at former construction sites. These sites are mainly areas of Hosmer and Stoy soils on uplands; Okaw, St. Charles, Hurst, and Camden soils on terraces; and Banlic soils on bottom lands. Slopes are mainly 0 to 3 percent but range to 20 percent on short side slopes.

Orthents, silty, differ from Hosmer, Okaw, Banlic, and other adjacent soils in lacking an orderly sequence of horizons or in consisting of only the subsoil and underlying material. They are classified only by the kind of soil material. Although variable, the soil mass is mostly mixed gray and brown silt loam or silty clay loam to a depth of about 60 inches.

The soil material is predominantly silt loam or silty clay loam but can also be clay loam, loam, and fine sandy loam and, less commonly, loamy fine sand and silty clay. Some coarse fragments are in a few pedons. An admixture of cinders, bricks, and debris is also in some pedons. Reaction is commonly strongly acid to slightly acid but ranges from extremely acid to mildly alkaline.

Piopolis Series

The Piopolis series consists of poorly drained and very poorly drained, slowly permeable soils that formed in silty clay loam alluvium. These nearly level soils are on flood plains along the major streams. Slopes are commonly less than 1 percent but range from 0 to 2 percent.

Piopolis soils are on the same flood plains as Belknap, Bonnie, Wakeland, and Jacob soils. They are more clayey than Belknap, Bonnie, and Wakeland soils and are less clayey than Jacob soils. Piopolis soils have a grayer solum than Belknap and Wakeland soils.

Typical pedon of Piopolis silty clay loam, approximately 552 feet north and 1,101 feet east of center of sec. 4, T. 7 S., R. 3 W., in a cultivated field:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) light silty clay loam; weak medium granular structure; firm; slightly acid; clear smooth boundary.

C1—7 to 20 inches; light brownish gray (10YR 6/2) light silty clay loam; few fine distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm; few dark stains and concretions; strongly acid; clear smooth boundary.

C2—20 to 41 inches; light brownish gray (10YR 6/2) silty clay loam; common fine distinct strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to weak medium subangular blocky; firm; common dark stains and concretions; strongly acid; clear smooth boundary.

C3g—41 to 66 inches; light brownish gray (2.5Y 6/2) silty clay loam; common fine distinct strong brown (7.5YR 5/6) mottles; massive; firm; common dark stains and concretions; medium acid changing to slightly acid with depth.

The soil is predominantly silty clay loam, averaging 27 to 35 percent clay in the control section, but it has thin strata of silt loam, loam, clay loam, and silty clay. The upper part of the C horizon, which extends to a depth of 40 inches or more, is strongly acid or very strongly acid, and the lower part of the C horizon is commonly medium acid or slightly acid.

Racoon Series

The Racoon series consists of poorly drained, slowly permeable soils that formed mainly in loess or silty sediments. Racoon soils occur in depressions on upland plains and on foot slopes grading from uplands or terraces to bottom lands. Overflow is occasionally received from higher areas or from nearby streams or drainageways. Slopes range from 0 to 2 percent.

Racoon soils occur near Bonnie, Banlic, and Jacob soils on bottom lands and terraces and near Bluford and Wynoose soils on uplands. They have a thicker A horizon than Bluford and Wynoose soils. They have more clay below the A horizon than Bonnie or Banlic soils. They are more silty throughout than Jacob soils.

Typical pedon of Racoon silt loam, approximately 900 feet north and 1,085 feet west of the center of sec. 31, T. 7 S., R. 1 W., in a cultivated field:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) (80 percent) and grayish brown (10YR 5/2) (20 percent) silt loam; weak medium granular structure, friable; few medium concretions; very strongly acid; abrupt smooth boundary.

A21—7 to 14 inches; grayish brown (10YR 5/2) silt loam; common fine distinct strong brown (7.5YR 5/6) mottles; weak thin platy structure; friable; few medium concretions; extremely acid; clear smooth boundary.

A22g—14 to 25 inches; light brownish gray (10YR 6/2) silt loam; few medium and coarse distinct strong brown (7.5YR 5/6) mottles; weak thin platy structure; friable; few medium and coarse dark stains; extremely acid; abrupt wavy boundary.

B1g—25 to 27 inches; light brownish gray (10YR 6/2) light silty clay loam; common fine distinct strong brown (7.5YR 5/6) mottles; moderate fine and medium subangular blocky structure; friable; patchy thin grayish brown (10YR 5/2) clay films and continuous light gray (10YR 7/2) uncoated silt grains on faces of peds; common fine concretions; extremely acid; abrupt wavy boundary.

B21tg—27 to 33 inches; light brownish gray (2.5Y 6/2) heavy silty clay loam; many medium prominent strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium and coarse angular blocky; firm; continuous grayish brown (2.5Y 5/2) clay films and patchy light gray (10YR 7/2) uncoated silt grains on faces of peds; common dark stains and concretions; extremely acid; clear smooth boundary.

B22tg—33 to 43 inches; light brownish gray (2.5Y 6/2) light silty clay loam; common medium and coarse prominent strong brown (7.5YR 5/6) mottles; weak medium and coarse subangular blocky structure; friable; patchy thin grayish brown (10YR 5/2) clay films on faces of peds; common dark stains and concretions; very strongly acid; clear smooth boundary.

B23tg—43 to 52 inches; light brownish gray (2.5Y 6/2) silty clay loam; common medium and coarse prominent strong brown (7.5YR 5/6) and yellowish red (5YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium and coarse subangular blocky; firm; continuous grayish brown (2.5Y 5/2) clay films on vertical faces and patchy on horizontal faces of peds; common dark stains and concretions; very strongly acid; clear smooth boundary.

B24tg—52 to 61 inches; light brownish gray (2.5Y 6/2) silty clay loam; many medium and coarse prominent strong brown (7.5YR 5/6) and yellowish red (5YR 5/6) mottles; weak coarse subangular blocky structure; firm; discontinuous grayish brown (2.5Y 5/2) clay films on faces of peds; common dark stains and concretions; very strongly acid; clear smooth boundary.

B3g—61 to 66 inches; light brownish gray (10YR 6/2) silt loam; many medium distinct strong brown (7.5YR 5/6) and yellowish red (5YR 5/6) mottles; weak coarse subangular blocky structure; friable; patchy thin grayish brown (10YR 5/2) clay films on faces of peds; common dark stains and concretions; medium acid.

The thickness of the A horizon ranges from 24 to about 36 inches. The B2t horizon is predominantly silty clay loam but has thin layers of heavy silt loam and silty clay. It ranges from strongly to extremely acid. The B3 and C horizons are mainly silt loam or silty clay loam, but some pedons have strata of loam or silty clay.

Raddle Series

The Raddle series consists of well drained and moderately well drained, moderately permeable soils that formed in silty stream sediments. Raddle soils are on alluvial fans of local streams flowing out from the bluff area onto the Mississippi River flood plain. Slopes range from 0 to 3 percent.

Raddle soils are commonly on the same landscape as Wakeland, Haymond, and Coffeen soils. They have a darker colored A horizon than Wakeland or Haymond soils and are less gray in the solum than Coffeen soils.

Typical pedon of Raddle silt loam, approximately 250 feet north and 1,320 feet west of the center of sec. 5, T. 10 S., R. 3 W., in a cultivated field:

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam; few grayish brown (10YR 5/2) splotches, light gray (10YR 7/2) dry; moderate very fine granular structure; friable; neutral; abrupt smooth boundary.

A12—7 to 12 inches; very dark grayish brown (10YR 3/2) silt loam; few grayish brown (10YR 5/2) splotches, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; neutral; gradual smooth boundary.

B1—12 to 17 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; weak fine prismatic structure parting to moderate fine angular blocky; friable; common fine pores; continuous very dark grayish brown (10YR 3/2) coatings and patchy white (10YR 8/2 dry) uncoated silt grains on faces of peds and in root channels; neutral; clear smooth boundary.

B21—17 to 23 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine prismatic structure parting to moderate fine angular and subangular blocky; friable; common fine pores; patchy very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) coatings and patchy white (10YR 8/2 dry) uncoated silt grains on faces of peds and in root channels; slightly acid; clear smooth boundary.

B22—23 to 35 inches; dark yellowish brown (10YR 4/4) silt loam; common fine distinct pale brown (10YR 6/3) mottles; weak fine and medium prismatic structure parting to weak fine and medium angular and subangular blocky; friable; many fine pores; patchy dark brown (10YR 3/3) coatings and white (10YR 8/2 dry) uncoated silt grains on faces of peds and in root channels; medium acid; gradual smooth boundary.

B23—35 to 50 inches; dark yellowish brown (10YR 4/4) light silt loam; common fine and medium distinct pale brown (10YR 6/3) mottles; weak medium and coarse prismatic structure; very friable; many fine pores; patchy dark brown (10YR 3/3) coatings and scattered white (10YR 8/2 dry) uncoated silt grains on faces of peds and in root channels; medium acid; gradual smooth boundary.

B3—50 to 65 inches; dark yellowish brown (10YR 4/4) light silt loam; common medium distinct pale brown (10YR 6/3) and common fine and medium prominent light brownish gray (2.5Y 6/2) mottles; weak medium and coarse prismatic structure; very friable; patchy dark brown (10YR 3/3) coatings and patchy white (10YR 8/2 dry) uncoated silt grains on faces of peds and along pores; sand grains; few fine dark concretions; medium acid; clear smooth boundary.

C—65 to 70 inches; yellowish brown (10YR 5/4) light silt loam; common fine and medium prominent light brownish gray (2.5Y 6/2) mottles; massive; very friable; many white (10YR 8/2 dry) uncoated silt grains and few dark brown (10YR 3/3) coatings in root channels, pores, and crevices; common fine dark concretions; medium acid.

The solum is predominantly silt loam, but some pedons have strata of loam and very fine sandy loam. The dark colored A1 and B1 horizons range from 10 to 24 inches in thickness. The B horizon ranges from medium acid to neutral and has grayish mottles below a depth of about 24 inches in some pedons. Buried soils occur below 4 feet in some pedons.

Sexton Series

The Sexton series consists of poorly drained, slowly permeable soils that formed in loess and silty water-laid sediments. Sexton soils are on broad flats of terrace plains. Slopes range from 0 to 2 percent.

Sexton soils commonly occur with Starks, Hurst, and Okaw soils. Sexton soils are more gray in the upper part of the B horizon than Starks and Hurst soils. They lack the abrupt change in clay content between the A and B horizons that is characteristic of Okaw soils and contain more sand in the lower part of the B horizon than Weir soils.

Typical pedon of Sexton silt loam, 100 feet south and 40 feet west of the center of sec. 32, T. 8 S., R. 1 W., in a cultivated field:

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) (60 percent) and grayish brown (10YR 5/2) (40 percent) silt loam; weak medium granular structure; friable; neutral; abrupt smooth boundary.

A21—5 to 13 inches; grayish brown (10YR 5/2) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate thick platy structure; firm, compact; neutral; clear smooth boundary.

A22—13 to 15 inches; light brownish gray (10YR 6/2) heavy silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate thin and medium platy structure; friable; strongly acid; clear smooth boundary.

B1t—15 to 19 inches; light brownish gray (10YR 6/2) light silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak fine and medium subangular blocky structure; firm; patchy thin grayish brown (10YR 5/2) clay films on faces of peds; strongly acid; clear smooth boundary.

B21t—19 to 23 inches; light brownish gray (10YR 6/2) heavy silty clay loam; common medium prominent strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm; patchy thin grayish brown (10YR 5/2) clay films on faces of peds; strongly acid; clear smooth boundary.

B22t—23 to 36 inches; light brownish gray (10YR 6/2) heavy silty clay loam; common medium distinct yellowish brown (10YR 5/4) and strong brown (7.5YR 5/6) mottles; moderate to strong medium prismatic structure parting to moderate medium angular blocky; very firm; continuous medium grayish brown (10YR 5/2) clay films on faces of peds; very strongly acid; clear smooth boundary.

B23t—36 to 42 inches; light brownish gray (10YR 6/2) silty clay loam; many medium distinct yellowish brown (10YR 5/4) mottles; moderate medium prismatic structure parting to weak medium angular blocky; firm; continuous grayish brown (10YR 5/2) clay films on vertical faces of peds and patchy on horizontal faces; strongly acid; clear smooth boundary.

IIB31t—42 to 46 inches; grayish brown (2.5Y 5/2) light clay loam; many medium and coarse prominent strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm; patchy grayish brown (10YR 5/2) films on faces of peds; sand is mostly very fine; strongly acid; clear smooth boundary.

IIB32—46 to 57 inches; light brownish gray (2.5Y 6/2) medium silty clay loam; common medium prominent strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky structure; firm; patchy grayish brown (10YR 5/2) films on faces of peds; strongly acid; clear smooth boundary.

IIC—57 to 63 inches; light brownish gray (2.5Y 6/2) heavy silt loam; few medium prominent strong brown (7.5YR 5/6) mottles; massive; friable to firm; medium acid.

The thickness of the A horizon ranges from about 10 to 20 inches. The upper part of the B2t horizon is heavy silty clay loam or light silty clay. The lower part is silty clay loam, heavy silt loam, or clay loam. The B2t horizon ranges from very strongly acid to medium acid. The C horizon can be silt loam, loam, and silty clay loam.

Starks Series

The Starks series consists of somewhat poorly drained, moderately slowly permeable soils that formed in silty material and the underlying loamy sediments. Starks soils are on very gently sloping ridges and nearly level plains of terraces. Slopes range from 0 to 3 percent.

Starks soils are on the same landscape as Camden, St. Charles, Alvin, and Hurst soils. They are more gray in the upper part of the B2t horizon than Camden, St. Charles, and Alvin soils. They contain less sand in the solum than Alvin soils and contain less clay than Hurst soils.

The Starks soils in this survey area are outside the range of the Starks series because they lack sufficient evidence of stratification, but this difference does not alter the usefulness and behavior of these soils.

Typical pedon of Starks silt loam, approximately 85 feet north and 1,235 feet west of southeast corner of sec. 24, T. 8 S., R. 2 N., in a cultivated field:

Ap—0 to 8 inches; grayish brown (10YR 5/2) silt loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; weak fine granular structure; friable; many roots; common fine sand grains; common fine concretions; mildly alkaline; abrupt smooth boundary.

A2—8 to 11 inches; pale brown (10YR 6/3) and light brownish gray (10YR 6/2) silt loam; common fine and medium distinct yellowish brown (10YR 5/6) mottles; weak thin platy structure; friable; many roots; common fine sand grains; light gray (10YR 7/2 dry) uncoated silt grains; common fine concretions; neutral; clear smooth boundary.

B1—11 to 15 inches; yellowish brown (10YR 5/4) light silty clay loam; few fine distinct light brownish gray (10YR 6/2) mottles; weak fine prismatic structure parting to moderate very fine and fine angular blocky; friable; many roots; patchy light brownish gray (10YR 6/2) coatings and light gray (10YR 7/2 dry) uncoated silt grains on faces of peds; few fine concretions; very strongly acid; clear smooth boundary.

B21t—15 to 22 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct light brownish gray (10YR 6/2) and common fine distinct yellowish brown (10YR 5/8) mottles; moderate fine and medium prismatic structure parting to moderate fine and medium angular blocky; firm; many roots; common brown (10YR 5/3) clay films and light gray (10YR 7/2 dry) uncoated silt grains on faces of peds; common fine concretions; very strongly acid; clear smooth boundary.

B22t—22 to 31 inches; yellowish brown (10YR 5/4) silty clay loam; common fine and medium distinct yellowish brown (10YR 5/6) and common fine distinct light brownish gray (10YR 6/2) mottles; moderate medium prismatic structure parting to moderate medium angular blocky structure; firm; many roots; common brown (10YR 5/3) clay films and light gray (10YR 7/2 dry) uncoated silt grains on faces of peds; common fine concretions; very strongly acid; clear smooth boundary.

IIB23t—31 to 41 inches; yellowish brown (10YR 5/8) (60 percent) and light brownish gray (10YR 6/2) (40 percent) loam; moderate medium coarse prismatic structure parting to moderate medium subangular blocky structure; firm; few roots; common brown (10YR 5/3) and grayish brown (10YR 5/2) clay films and patchy light gray (10YR 7/2 dry) uncoated silt grains on faces of peds; common fine concretions; strongly acid; clear smooth boundary.

IIB3t—41 to 52 inches; light brownish gray (10YR 6/2) (50 percent) and yellowish brown (10YR 5/8) (50 percent) silt loam; weak coarse subangular blocky structure; firm; few roots; common grayish brown (10YR 5/2) clay films and light gray (10YR 7/2 dry) uncoated silt grains on vertical faces of peds; many dark stains and accumulations; many fine sand grains; medium acid; clear smooth boundary.

C—52 to 64 inches; gray (5YR 5/1) silt loam; common medium and coarse prominent yellowish brown (10YR 5/8) mottles; massive; friable; few roots; common dark stains; mildly alkaline.

Loamy material (the IIB horizon) begins at a depth of 25 to 40 inches. The IIB horizon ranges from fine sandy loam to clay loam. The B horizon ranges from very strongly acid to medium acid. The C horizon is commonly stratified and ranges from sandy loam to silty clay loam.

Stoy Series

The Stoy series consists of somewhat poorly drained, slowly permeable soils that formed in loess. Stoy soils are on drainage divides or plains, on broad ridgetops, and at the head of drainageways in the uplands. Slopes are commonly 2 to 4 percent but range from 0 to 7 percent.

Stoy soils are on the same landscape as Hosmer and Weir soils and have pedons similar to those of Bluford soils. Stoy soils are more gray in the upper part of the B2t horizon than Hosmer soils. They contain less clay in the B2t horizon than Bluford soils. Stoy soils have a less gray subsoil than the poorly drained Weir soils.

Typical pedon of Stoy silt loam, 2 to 4 percent slopes, approximately 320 feet south and 286 feet west of the center of sec. 29, T. 9 S., R. 1 W., in a cultivated field:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) and brown (10YR 5/3) silt loam; weak fine granular structure; friable; common fine dark concretions; mildly alkaline; abrupt smooth boundary.

A2—8 to 14 inches; yellowish brown (10YR 5/4) silt loam; few fine and medium faint pale brown (10YR 6/3) and yellowish brown (10YR 5/6) mottles; weak thin platy structure; friable; common fine dark concretions; slightly acid; clear smooth boundary.

B&A—14 to 19 inches; yellowish brown (10YR 5/6) heavy silt loam (B2t); weak very fine subangular blocky structure; friable; pale brown (10YR 6/3) and light brownish gray (10YR 6/2) silt (A2); massive; very friable; thick white (10YR 8/1 dry) uncoated silt grains on faces of peds; many fine dark concretions; extremely acid; clear smooth boundary.

B21t—19 to 24 inches; yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2) silty clay loam; common medium distinct strong brown (7.5YR 5/6) mottles; moderate fine subangular blocky structure; firm; continuous brown (10YR 5/3) clay films and thick white (10YR 8/1 dry) uncoated silt grains on faces of peds; very strongly acid; clear smooth boundary.

B22t—24 to 32 inches; strong brown (7.5YR 5/6) and light brownish gray (10YR 6/2) silty clay loam; moderate medium subangular blocky structure; firm; continuous brown (10YR 5/3) clay films and patchy white (10YR 8/1 dry) uncoated silt grains on faces of peds; very strongly acid; gradual smooth boundary.

B23t—32 to 42 inches; dark brown (7.5YR 4/4) and light brownish gray (10YR 6/2) light silty clay loam; common medium faint strong brown (7.5YR 5/6) mottles; weak medium and coarse subangular blocky structure; firm; patchy thin brown (10YR 5/3) clay films on faces of peds; common dark stains; very strongly acid; gradual smooth boundary.

Bx—42 to 56 inches; dark yellowish brown (10YR 4/4) and light brownish gray (10YR 6/2) silt loam; common fine faint yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm and slightly brittle; patchy thin brown (10YR 5/3) clay films on faces of peds; many dark stains; very strongly acid; gradual smooth boundary.

C—56 to 64 inches; yellowish brown (10YR 5/4) silt loam; many fine and medium distinct strong brown (7.5YR 5/6) and light brownish gray (10YR 6/2) mottles; massive; friable; strongly acid.

The thickness of the A horizon ranges from 10 to 20 inches. Depth to the dense, slightly brittle Bx horizon ranges from 36 to 48 inches.

St. Charles Series

The St. Charles series consists of moderately well drained or well drained, moderately permeable soils that formed in loess and silty water-laid sediments. St. Charles soils are on ridges, plains, and side slopes of terraces. Slopes range from 2 to 7 percent.

St. Charles soils are on the same landscape as Hurst, Colp, and Camden soils. They contain less clay in the B2 horizon than Hurst and Colp soils and contain less sand in the lower part of the B horizon than Camden soils.

The St. Charles soils in Jackson County show less evidence of stratification and have a solum that is more acid than is defined as the range for the series. These differences, however, do not alter the use and behavior of the soils.

Typical pedon of St. Charles silt loam, 2 to 7 percent slopes, approximately 525 feet south and 90 feet west of the center of sec. 2, T. 8 S., R. 2 W., in a cultivated field:

Ap—0 to 7 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; friable; many roots; few fine concretions; slightly acid; abrupt smooth boundary.

A2—7 to 10 inches; dark yellowish brown (10YR 4/4) silt loam; weak thin platy structure parting to weak fine granular; friable; many roots; patchy light gray (10YR 7/2 dry) uncoated silt grains; common fine dark stains and concretions; medium acid; clear smooth boundary.

B1t—10 to 13 inches; dark yellowish brown (10YR 4/4) heavy silt loam; weak very fine angular and subangular blocky structure; firm; common roots; dark yellowish brown (10YR 4/4) clay films and patchy light gray (10YR 7/2 dry) uncoated silt grains on faces of peds; common fine dark concretions; medium acid; clear smooth boundary.

B21t—13 to 19 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak fine prismatic structure parting to moderate very fine and fine angular blocky; firm; common roots; dark brown (7.5YR 4/4) clay films and continuous light gray (10YR 7/2 dry) uncoated silt grains on faces of peds; common fine dark concretions; strongly acid; clear smooth boundary.

B22t—19 to 26 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine and medium prismatic structure parting to moderate fine subangular blocky; very firm; common roots; dark brown (7.5YR 4/4) clay films and continuous light gray (10YR 7/2 dry) uncoated silt grains on vertical faces of peds; common fine dark concretions and stains; strongly acid; clear smooth boundary.

B23t—26 to 35 inches; dark yellowish brown (10YR 4/4) silty clay loam; common fine distinct yellowish brown (10YR 5/8) and light brownish gray (10YR 6/2) mottles; moderate medium prismatic structure parting to moderate fine and medium angular blocky; very firm; common roots; dark brown (7.5YR 4/4) clay films and thick light gray (10YR 7/2 dry) uncoated silt grains on faces of peds; many fine dark stains and concretions; strongly acid; clear smooth boundary.

B3t—35 to 55 inches; light brownish gray (2.5Y 6/2) silty clay loam; many fine and medium distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to weak moderate medium subangular blocky; firm; few roots; discontinuous grayish brown (10YR 5/2) clay films and patchy light gray (10YR 7/2 dry) uncoated silt grains on faces of peds; many dark stains; strongly acid; clear smooth boundary.

C—55 to 67 inches; grayish brown (10YR 5/2) silty clay loam; many fine medium and coarse prominent strong brown (7.5YR 5/6) and common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; few roots; patchy grayish brown (10YR 5/2) clay films on faces of peds; many dark stains; medium acid.

The B2t horizon averages silty clay loam, but some pedons have layers of heavy silt loam to silty clay in the lower part. The sand content in the solum ranges from 5 to 15 percent and varies with depth. The B2t horizon ranges from very strongly acid to medium acid. The B3 and C horizons range from loam to silty clay.

Wakeland Series

The Wakeland series consists of somewhat poorly drained, moderately permeable soils that formed in silty stream sediments. Wakeland soils are along streams and overflow channels and on alluvial fans on bottom lands. These soils have slopes of 0 to 2 percent.

Wakeland soils are commonly on the same flood plains as Haymond soils and have pedons similar to those of Belknap and Banlic soils. Wakeland soils are more gray in the substratum than Haymond soils. They are less acid than Belknap and Banlic soils and lack the dense Bx horizon of Banlic soils.

Typical pedon of Wakeland silt loam, approximately 2,580 feet south and 45 feet west of the northeast corner of sec. 26, T. 8 S., R. 5 W., in a cultivated field:

Ap—0 to 9 inches; brown (10YR 4/3) light silt loam; weak fine granular structure; very friable; slightly acid; abrupt smooth boundary.

A12—9 to 13 inches; brown (10YR 5/3) light silt loam; weak fine granular structure; slight traffic compaction in upper portion of horizon; friable; slightly acid; abrupt smooth boundary.

C1—13 to 17 inches; brown (10YR 5/3) light silt loam; common fine faint grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; massive; very friable; slightly acid; gradual wavy boundary.

C2—17 to 39 inches; grayish brown (10YR 5/2) light silt loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; massive; very friable; slightly acid; gradual wavy boundary.

C3—39 to 60 inches; light brownish gray (10YR 6/2) light silt loam; common medium distinct brown (10YR 4/3) mottles; massive; very friable; neutral.

The A and C horizons range from medium acid to neutral. Thickness of the combined A and C1 horizons ranges from 10 to 20 inches. Strata of loam and fine sandy loam are in the lower part of the C horizon of some pedons.

Ware Series

The Ware series consists of well drained or moderately well drained, moderately permeable to moderately rapidly permeable soils that formed in loamy and sandy sediments. Ware soils occur on narrow to broad, undulating ridges and natural levees of the Mississippi River flood plain. Slopes range from 0 to 6 percent.

Ware soils are commonly on the same flood plains as Medway and Gorham soils. They are less clayey in the solum than Medway and Gorham soils.

Typical pedon of Ware loam, approximately 660 feet south and 690 feet east of the northwest corner of sec. 27, T. 9 S., R. 4 W., in a cultivated field:

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) loam; weak medium granular structure; friable; common roots; medium acid; abrupt smooth boundary.

A12—7 to 11 inches; very dark brown (10YR 2/2) loam; weak medium granular structure; friable; few roots; slightly acid; clear smooth boundary.

A13—11 to 14 inches; very dark brown (10YR 2/2) loam; weak coarse granular structure; friable; few roots; slightly acid; clear smooth boundary.

B2—14 to 21 inches; mixed brown (10YR 4/3) and very dark grayish brown (10YR 3/2) very fine sandy loam; weak medium subangular blocky structure; very friable; few roots; slightly acid; clear smooth boundary.

C1—21 to 30 inches; stratified yellowish brown (10YR 5/4) loamy very fine sand and brown (10YR 4/3) and very dark grayish brown (10YR 3/2) very fine sandy loam; single grained; very friable; few roots; neutral; clear smooth boundary.

C2—30 to 38 inches; yellowish brown (10YR 5/4) and brown (10YR 4/3) very fine sandy loam; massive; very friable; lenses of dark brown (10YR 3/3); neutral; gradual smooth boundary.

C3—38 to 54 inches; yellowish brown (10YR 5/4) very fine sandy loam; massive; very friable; few lenses of dark brown (10YR 3/3) in upper 6 inches and streaks of pale brown (10YR 6/3) in lower part; neutral; clear smooth boundary.

C4—54 to 60 inches; grayish brown (10YR 5/2), dark yellowish brown (10YR 4/4), and yellowish brown (10YR 5/6) heavy very fine sandy loam; massive; very friable; neutral.

The solum ranges in texture from very fine sandy loam to silt loam. The B horizon of some pedons has loamy very fine sand and loamy fine sand layers. The C horizon ranges from silt loam to sand but is dominantly very fine sandy loam to fine sand. Reaction of the solum ranges from medium acid to neutral, and the C horizon ranges from slightly acid to moderately alkaline.

Weir Series

The Weir series consists of poorly drained, very slowly permeable soils that formed in loess. Weir soils are on upland flats and the head of drainageways. Slopes range from 0 to 2 percent.

Weir soils commonly occur on the same ridges as Stoy soils and have pedons similar to those of Wynoose, Racoon, and Sexton soils. Weir soils have grayer colors and more clay in the B2t horizon than Stoy soils. They lack the abrupt change in clay content between the A and B horizons that is characteristic of Wynoose soils. Weir soils have a thinner A horizon and have more clay in the B2t horizon than Racoon soils. They have less sand in the lower part of the B horizon than Sexton soils.

Typical pedon of Weir silt loam, approximately 60 feet north and 1,870 feet east of the southwest corner of sec. 29, T. 9 S., R. 1 W., in a cultivated field:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) silt loam; weak fine granular structure; friable; common dark concretions; patchy thin light gray (10YR 7/2) uncoated silt grains on faces of peds; neutral; abrupt smooth boundary.

A2—7 to 13 inches; light brownish gray (10YR 6/2) silt loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak thin and medium platy structure; friable; common dark stains and concretions; very strongly acid; abrupt smooth boundary.

B1t—13 to 17 inches; light brownish gray (10YR 6/2) light silty clay loam; few fine distinct strong brown (7.5YR 5/6) mottles; moderate fine and medium subangular blocky structure; friable; continuous thin grayish brown (10YR 5/2) clay films and patchy thin light gray (10YR 7/2) uncoated silt grains on faces of peds; very strongly acid; abrupt smooth boundary.

B22tg—17 to 25 inches; light brownish gray (2.5Y 6/2) heavy silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate fine and medium angular blocky; very firm; continuous thin grayish brown (2.5Y 5/2) clay films and patchy light gray (10YR 7/2) uncoated silt grains on faces of peds; common fine dark stains and concretions; very strongly acid; clear smooth boundary.

B23tg—25 to 36 inches; light brownish gray (2.5Y 6/2) heavy silty clay loam; few fine distinct strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; very firm; continuous thin and medium grayish brown (2.5Y 5/2) clay films and common light gray (10YR 7/2) uncoated silt grains on faces of peds; common fine dark stains and concretions; very strongly acid; clear smooth boundary.

B24tg—36 to 42 inches; light brownish gray (2.5Y 6/2) heavy silty clay loam; common medium distinct strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to weak medium angular blocky; very firm; continuous thin and medium grayish brown (2.5Y 5/2) clay films and light gray (10YR 7/2) uncoated silt grains on faces of peds; common dark stains and concretions; very strongly acid; clear smooth boundary.

B25tg—42 to 52 inches; light brownish gray (2.5Y 6/2) silty clay loam; common medium distinct strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to weak coarse subangular blocky; firm; patchy thin grayish brown (2.5Y 5/2) clay films on faces of peds; common dark stains and concretions; strongly acid; clear smooth boundary.

B3t—52 to 66 inches; light brownish gray (10YR 6/2) silt loam; many medium and coarse prominent strong brown (7.5YR 5/6) and yellowish red (5YR 5/6) mottles; weak coarse subangular blocky structure; firm; patchy thin grayish brown (2.5Y 5/2) clay films on faces of peds; common dark stains; medium acid; clear smooth boundary.

C—66 to 75 inches; light brownish gray (10YR 6/2) silt loam; many medium and coarse prominent strong brown (7.5YR 5/6) and yellowish red (5YR 5/6) mottles; massive; friable; common dark stains; slightly acid.

The thickness of the A horizon ranges from about 10 to 20 inches. The upper part of the B2 horizon is heavy silty clay loam or silty clay. The lower part is silty clay loam or heavy silt loam.

Wellston Series

The Wellston series consists of well drained, moderately permeable soils that formed in loess and the underlying material that weathered from siltstone, sandstone, and shale bedrock. Wellston soils are on steep and very steep hillsides of uplands. Slopes are generally long. They are commonly 15 to 30 percent but range to 50 percent.

Wellston soils are on the same hillsides as Neotoma, Alford, and Hickory soils. Wellston soils contain fewer coarse fragments in the solum than Neotoma soils but contain more coarse fragments in the lower part of the B horizon than Alford and Hickory soils.

Typical pedon of Wellston silt loam, in an area of Alford-Wellston silt loams, 15 to 30 percent slopes, approximately 2,574 feet north and 165 feet west of the southeast corner of sec. 9, T. 10 S., R. 2 W., in a wooded area:

A1—0 to 1 inch; dark grayish brown (10YR 4/2) light silt loam; moderate fine granular structure; friable; strongly acid; abrupt smooth boundary.

A2—1 to 6 inches; yellowish brown (10YR 5/4) light silt loam; weak thin platy structure parting to weak fine granular; friable; some dark grayish brown (10YR 4/2) in root channels; extremely acid; clear smooth boundary.

B1t—6 to 12 inches; strong brown (7.5YR 5/6) heavy silt loam; weak fine subangular blocky structure; friable; dark brown (7.5YR 4/4) patchy thin clay films on faces of peds; very strongly acid; clear smooth boundary.

B21t—12 to 22 inches; strong brown (7.5YR 5/6) silty clay loam; moderate fine subangular blocky structure; firm; dark brown (7.5YR 4/4) continuous clay films on faces of peds; very strongly acid; clear smooth boundary.

B22t—22 to 29 inches; strong brown (7.5YR 5/6) light silty clay loam; moderate medium subangular blocky structure; firm; dark brown (7.5YR 4/4) continuous thin clay films and few light gray (10YR 7/2) uncoated silt grains on faces of peds; very strongly acid; clear smooth boundary.

B23t—29 to 35 inches; strong brown (7.5YR 5/6) heavy silt loam; moderate medium subangular blocky structure; firm; dark brown (7.5YR 4/4) discontinuous thin clay films and common light gray (10YR 7/2) uncoated silt grains on faces of peds; very strongly acid; clear smooth boundary.

IIB31t—35 to 40 inches; strong brown (7.5YR 5/6) heavy silt loam; weak medium subangular blocky structure; firm, slightly hard dry; yellowish red (5YR 5/6) discontinuous thin clay films and common light gray (10YR 7/2) uncoated silt grains on faces of peds; many sand grains and 5 to 10 percent coarse fragments; very strongly acid; clear irregular boundary.

IIB32t—40 to 50 inches; strong brown (7.5YR 5/6) very cobbly heavy loam; weak medium subangular blocky structure; firm, slightly hard dry; yellowish red (5YR 5/6) discontinuous thin clay films and few very pale brown (10YR 7/3) uncoated silt grains on faces of peds

and fragments; approximately 85 percent coarse fragments; very strongly acid; abrupt irregular boundary.

R—50 inches; fractured sandstone and siltstone bedrock.

Depth to bedrock ranges from 40 to 72 inches, but fractures and cracks commonly extend deeper. The A horizon has mainly few to no coarse fragments, and the content of coarse fragments increases with depth. The lower part of the IIB32t horizon is loam or clay loam. Sandy and clayey lenses that weathered from bedrock are in some pedons. Reaction ranges from extremely acid to strongly acid in the subsoil.

Wynoose Series

The Wynoose series consists of poorly drained, very slowly permeable soils that formed in loess. Wynoose soils are on drainage divides on till plains in the uplands. Slopes range from 0 to 2 percent.

Wynoose soils commonly occur on the same plains as Bluford and Racoon soils. Wynoose soils have grayer colors in the B horizon than Bluford soils and have a thinner A horizon and more clay in the B2t horizon than Racoon soils.

Typical pedon of Wynoose silt loam, approximately 1,371 feet south and 42 feet east of northwest corner of sec. 11, T. 7 S., R. 2 W., in a cultivated field:

Ap—0 to 5 inches; grayish brown (10YR 5/2) silt loam with many fine distinct yellowish brown (10YR 5/8) mottles; weak fine granular structure; friable; many fine concretions (iron and manganese oxides); neutral; abrupt smooth boundary.

A21—5 to 10 inches; light gray (10YR 6/1) and light brownish gray (10YR 6/2) silt loam with many fine and medium distinct yellowish brown (10YR 5/8) mottles; weak fine and medium granular structure; friable; common fine and medium concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

A22—10 to 14 inches; light gray (10YR 7/1) silt loam with common medium distinct yellowish brown (10YR 5/8) mottles; weak thin platy structure; friable; vesicular; common fine medium and large concretions (iron and manganese oxides); very strongly acid; abrupt smooth boundary.

B21t—14 to 19 inches; grayish brown (10YR 5/2) light silty clay with common medium distinct yellowish brown (10YR 5/8) mottles; moderate medium prismatic structure parting to moderate fine angular and subangular blocky structure; very firm; continuous grayish brown (10YR 5/2) clay films and thick light gray (10YR 7/1) to white (10YR 8/1) uncoated silt grains on faces of peds; common fine and medium concretions (iron and manganese oxides); strongly acid; clear smooth boundary.

B22t—19 to 32 inches; grayish brown (10YR 5/2) light silty clay with common fine distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to weak fine and medium angular and subangular blocky structure; very firm; continuous grayish brown (10YR 5/2) clay films and light gray (10YR 7/2) uncoated silt grains on faces of large peds; strongly acid; clear smooth boundary.

B23t—32 to 44 inches; grayish brown (10YR 5/2) silty clay loam with common fine distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; patchy grayish brown (10YR 5/2) clay films and light gray (10YR 7/2) uncoated silt grains on faces of peds; common dark yellowish brown (10YR 3/4) concretions (iron and manganese oxides) and stains; few black (N 2/0) stains and fillings of old root channels; krotovinas; strongly acid; gradual smooth boundary.

B31t—44 to 58 inches; grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) light silty clay loam with common medium and coarse prominent dark brown (7.5YR 4/4) and common fine and medium distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; patchy grayish brown (2.5YR 5/2) clay films on faces of peds; many black (N 2/0) stains and fillings of old root channels; medium acid; clear smooth boundary.

IIC—58 to 65 inches; gray (10YR 6/1) silt loam with many medium and coarse distinct yellowish brown (10YR 5/6) mottles; very weak coarse subangular blocky structure to massive; friable; neutral.

The upper part of the B2t horizon is silty clay or heavy silty clay loam. The lower part of the B horizon is silty clay loam or heavy silt loam. Reaction of the B horizon is strongly acid to extremely acid.

References

(1) American Association of State Highway [and Transportation] Officials. 1970. Standard specifications for highway materials and methods of sampling and testing. Ed. 10, 2. vol., illus.

(2) Illinois State Geological Survey. 1915. Extinct lakes in southern and western Illinois. Bull. 20, pp. 139-151, illus.

(3) Illinois State Geological Survey. 1974. Coal reserves of Illinois. Ill. Miner., Note 53, pp. 1-24, illus.

(4) Mohlenbrock, Robert H. 1974. Jackson County part 1: a new geography of Illinois. Outdoor Ill.: pp. 15-38.

(5) United States Bureau of the Census. 1970. Census of population.

(6) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus. [Supplements replacing pp. 173-188 issued May 1962]

(7) United States Department of Agriculture. 1975. Soil taxonomy: a basic system of soil classification for making and interpreting soil surveys. U.S. Dep. Agric. Handb. 436, 754 pp., illus.

(8) United States Department of Defense. 1968. Unified soil classification system for roads, airfields, embankments and foundations. MIL-STD-619B, 30 pp., illus.

(9) Illinois Conservation Needs Committee. 1970. Illinois soil and water conservation needs inventory. Coop. Ext. Serv., Coll. of Agric., Univ. of Ill. at Urbana-Champaign, 192 pp., illus.

(10) University of Illinois. 1970. Productivity of Illinois soils. Coll. of Agric., Coop. Ext. Serv., Circ. 1016, 16 pp.

(11) Willman, H. B. and J. C. Frye. 1970. Pleistocene stratigraphy of Illinois. State Geol. Bull. 94, 204 pp.

Glossary

AASHTO classification (soil engineering). The classification of soils and soil aggregate mixtures for highway construction that is used by the American Association of State Highway and Transportation Officials.

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil that has an A and a C horizon but no B horizon. Commonly such soils are immature, for example, those forming in alluvium or those on steep, rocky slopes.

Alluvial fan. A fan-shaped deposit of sand, gravel, and fine material dropped by a stream where the gradient decreases.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim. An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single mapping unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	More than 9

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to frequent flooding.

Buried soil. A developed soil, once exposed but now underlying more recently formed soil.

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Claypan tillage. Cultivation to prevent the growth of all vegetation except the particular crop desired.

Coarse fragments. Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Complex, soil. A mapping unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

Compressible. Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour farming. Plowing, cultivating, planting, and harvesting in rows that are at right angles to the natural direction of the slope or that are parallel to terrace grade.

Contour stripcropping. Growing crops in strips that follow the contour or are parallel to terraces or diversions. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue. The part of a plant, or crop, left in the field after harvest.

Cutbanks cave. Unstable walls of cuts made by earthmoving equipment. The soil sloughs easily.

Deferred grazing. A delay in grazing until range plants have reached a specified stage of growth. Grazing is deferred in order to increase the vigor of forage and to allow desirable plants to produce seed. Contrasts with continuous grazing and rotation grazing.

Depth to rock. Bedrock at a depth that adversely affects the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Favorable. Favorable soil features for the specified use.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. None means that flooding is not probable; rare that it is unlikely but possible under unusual weather conditions; occasional that it occurs on an average of once or less in 2 years; and frequent that it occurs on an average of more than once in 2 years. Duration is expressed as very brief if less than 2 days, brief if 2 to 7 days, and long if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

Forage. Plant material used as feed by domestic animals. Forage can be grazed or cut for hay.

Forb. Any herbaceous plant not a grass or a sedge.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action. Freezing and thawing of soil moisture. Frost action can damage structures and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the assorted and unassorted material deposited by streams flowing from glaciers.

Glacial till (geology). Unassorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Habitat. The natural abode of a plant or animal; refers to the kind of environment in which a plant or animal normally lives, as opposed to the range or geographical distribution.

Hardwood. Generally, one of the group of broad-leaved deciduous trees, including the wood from them, regardless of texture.

Heaving (of plants). The partial lifting of plants out of the ground, frequently breaking the roots, that results from the freezing and thawing of material in winter.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hue. One of the three variables of color. The dominent spectral (rainbow) color; it is related to the dominant wavelength of the light. See Munsell notation.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered, but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The accumulation of material in a soil horizon through the deposition of suspended material and organic matter removed from horizons above. Since part of the fine clay in the B horizon (or subsoil) of many soils has moved into the B horizon from the A horizon above, the B horizon is called an illuvial horizon.

Immature soil. A soil lacking clearly defined horizons because the soil-forming forces have acted on the parent material only a short time.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Intermittent stream. A stream or part of a stream that flows only in direct response to precipitation. It receives little or no water from springs and no long-continued supply from melting snow or other sources.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Land leveling. The reshaping of the ground surface to make for a more uniform applicaton of irrigation water.

Landscape. All the characteristics that distinguish a certain kind of area on the earth's surface. Any one kind of soil is said to have a characteristic natural landscape, and under different uses it has one or more characteristic cultural landscapes.

Large stones. Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

Leaching. The removal of soluble material from soil or other material by percolating water.

Legume. A member of the legume or pulse family (*Leguminosae*). One of the most important and widely distributed plant families. Includes many valuable forage species, such as peas, beans, peanuts, clover, alfalfa, sweet clover, lespedeza vetch, and kudzu. Practically all legumes are nitrogen-fixing plants, and many of the herbaceous species are used as cover and green-manure crops. Even some of the legumes that have no forage value (crotalaria and some lupines) are used for soil improvement. Other legumes are locust, honeylocust, redbud, mimosa, wisteria, and many tropical plants.

Lime. Chemically, calcium oxide, but also all limestone-derived materials applied to neutralize acid soils. Agricultural lime can be obtained as ground limestone, hydrated lime, or burned lime, with or without magnesium minerals. Basic slag, oystershells, and marl also contain calcium.

Lime concretion. An aggregate cemented by the precipitation of calcium carbonate.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. Inadequate strength for supporting loads.

Made land. Areas filled artificially with earth, trash, or both.

Mature soil. Any soil with well developed soil horizons having characteristics produced by the natural processes of soil formation and in near equilibrium with its present environment.

Meadow. A field in which biennial or perennial crops are grown for hay.

Mechanical analysis. The percentage of the various sizes in individual mineral particles, or separates, in the soil. Also, a laboratory method of determining soil texture.

Mine dumps. Areas of waste from mines, quarries, or smelters.

Miscellaneous areas. Areas that have little or no natural soil, are too nearly inaccessible for orderly examination, or cannot otherwise be feasibly classified.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse* more than 15 millimeters (about 0.6 inch).

Mulch. A natural or artificially applied layer of plant residue or other material on the surface of the soil. Mulch is generally used to help conserve moisture, control temperature, prevent surface compaction or crusting, reduce runoff and erosion, improve soil structure, or control weeds. Common mulch materials are wood chips, plant residue, sawdust, and compost.

Munsell notation. A designation of color by degrees of the three single variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3.

Nitrogen-fixing plant. A plant that can take in and fix the free nitrogen in the atmosphere by the aid of bacteria living in the root nodules. Legumes with the associated rhizobium bacteria in the nodules of roots are the most important nitrogen-fixing plants. Fixation brought about by the aid of bacteria in plant roots is called symbiotic fixation; if brought about by free-living organisms acting independently, it is referred to as nonsymbiotic fixation.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Plant nutrients are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Open drain. A ditch constructed to remove surplus water from wet land; may also include cross-slope ditches on sloping land.

Organic matter. A general term for plant and animal material, in or on the soil, in all states of decomposition. Readily decomposed organic matter is often distinguished from the more stable forms that are past the stage of rapid decomposition.

Overgrazing. Grazing so heavy as to impair future forage production and to deteriorate plants, soil, or both. Contrasts with undergrazing.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

Permanent pasture. Pasture that is on the soil for a long time, in contrast to rotation pasture, which is on the soil only a year or two because it is grown in rotation with other crops.

Permafrost. Layers of soil, or even bedrock, occuring in arctic or subarctic regions, in which a temperature below freezing has existed continuously for a long time.

Phase, soil. A subdivision of a soil series or other unit in the soil classification system based on differences in the soil that affect its management. A soil series, for example, may be divided into phases on the basis of differences in slope, stoniness, thickness, or some other characteristic that affects management. These differences are too small to justify separate series.

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Piping. Moving water forms subsurface tunnels or pipelike cavities in the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from a semisolid to a plastic state.

Plow layer. The soil ordinarily moved in tillage; equivalent to surface soil.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Poor outlets. Surface or subsurface drainage outlets difficult or expensive to install.

Puddled soil. A soil that is dense, massive, and without regular structure because it has been artificially compacted when wet. Commonly, a puddled soil is a clayey soil that has been tilled when wet.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

Rolling. Having moderately steep, complex slopes; intermediate between undulating and hilly.

Root zone. The part of the soil that can be penetrated by plant roots.

Rotation grazing. Grazing two or more pastures, or parts of a range, in regular order, with definite recovery periods between grazing periods. Contrasts with continuous grazing.

Rotation pasture. A cultivated area used as a pasture one or more years as a part of crop rotation. Contrasts with permanent pasture.

Row crops. A crop planted in rows, generally 2 to 4 feet apart, so as to allow cultivation between rows during the growing season.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandy soils. A broad term for soils of the sand and loamy sand classes; soil material with more than 70 percent sand and less than 15 percent clay.

Section. A standard subdivision of area used in the United States Land Office surveys, intended to be 1 mile square and to contain 640 acres.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Shrub. A woody perennial plant differing from a perennial herb by its persistent and woody stems, and from a tree by its low stature and habit of branching from the base.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slick spot. Locally, a small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slow refill. The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil map. A map designed to show the distribution of soil mapping units in relation to the prominent physical and cultural features of the earth's surface.

Soil survey. A systematic examination, description, classification, and mapping of soils in an area. Soil surveys are classified according to intensity of field examination as exploratory, reconnaissance, or detailed.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subgrade (engineering). The substratum, consisting of in-place material or fill material, that is prepared for highway construction; does not include stabilized base course or actual paving material.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. A term used in nontechnical soil descriptions for one or more layers above the subsoil. Includes A horizon and part of B horizon; has no depth limit.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Talus. Fragments of rock and other soil material accumulated by force of gravity at the base of cliffs or steep slopes.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer. Otherwise suitable soil material too thin for the specified use.

Tile drain. Concrete or pottery pipe placed at suitable spacings and depths in the soil or subsoil to provide water outlets from the soil.

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Unified soil classification system (engineering). The system of mechanical soil classification of the Corps of Engineers, Department of the Army. Used by the Soil Conservation Service, the Bureau of Reclamation, and other agencies that use soils in construction.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Unstable fill. Risk of caving or sloughing in banks of fill material.

Value (color). One of three variables of color. Value increases as the relative intensity of reflected light increases. See Munsell notation.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Illustrations

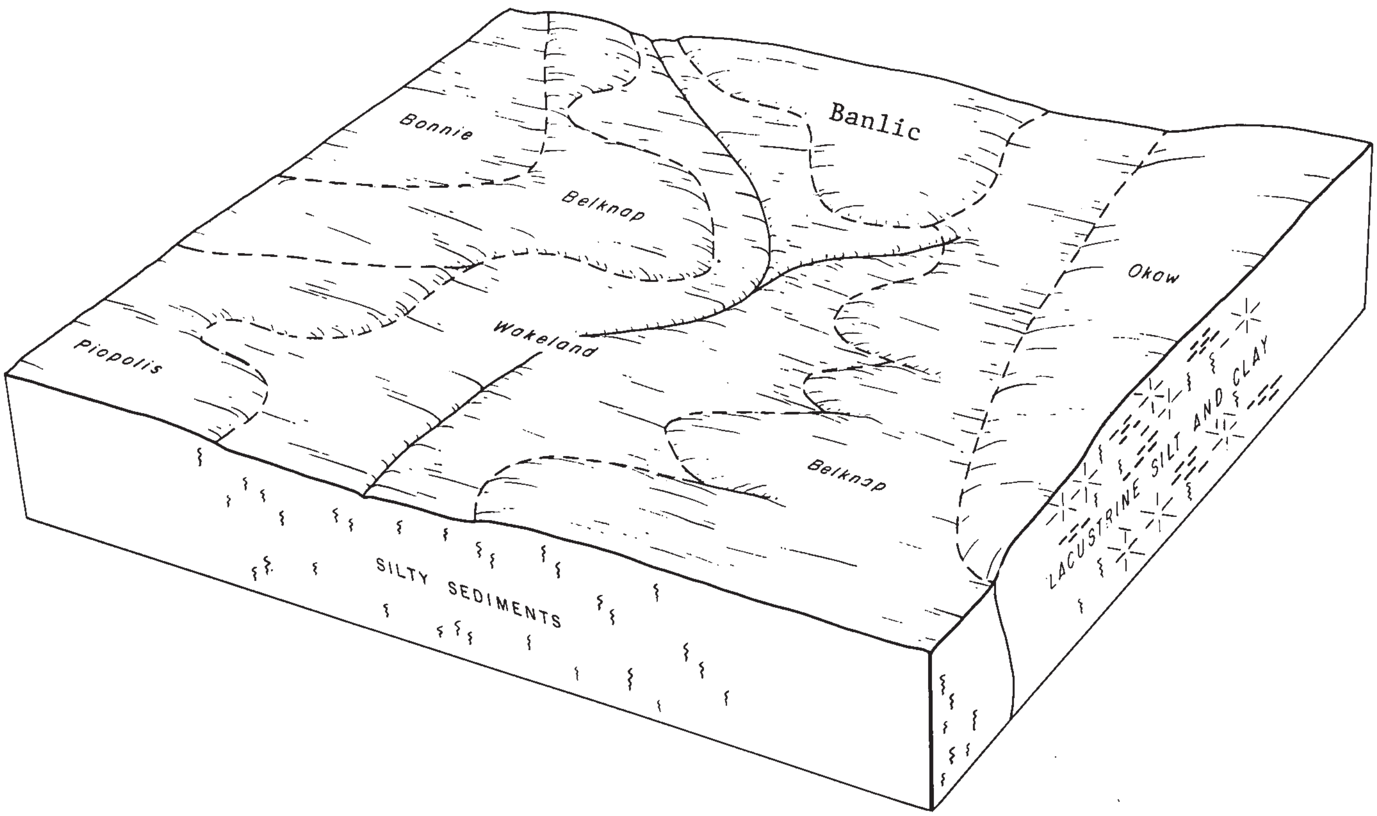

Figure 1.—Typical pattern of soils and underlying material in Belknap-Wakeland association.

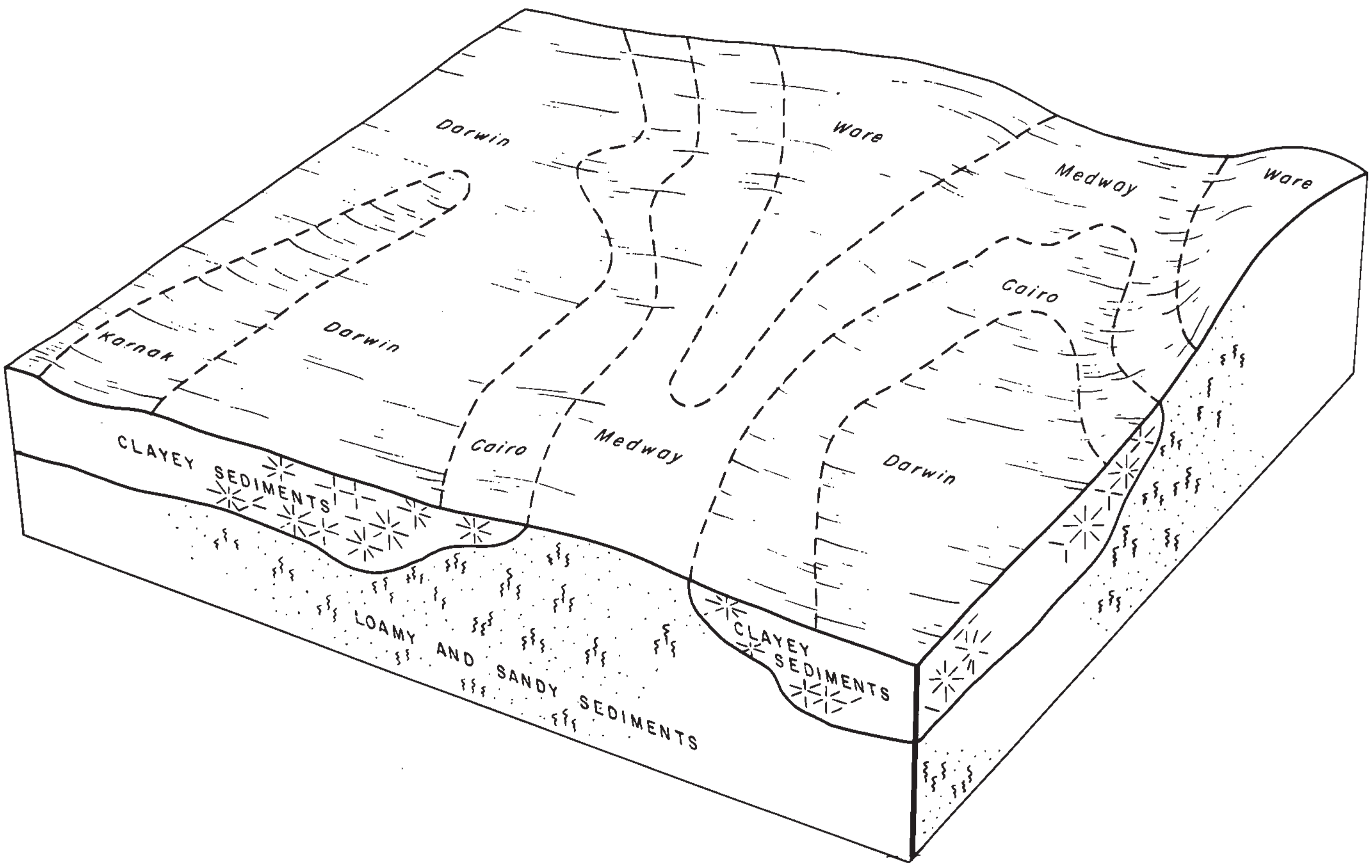

Figure 2.—Typical pattern of soils and underlying material in Darwin-Medway-Cairo association.

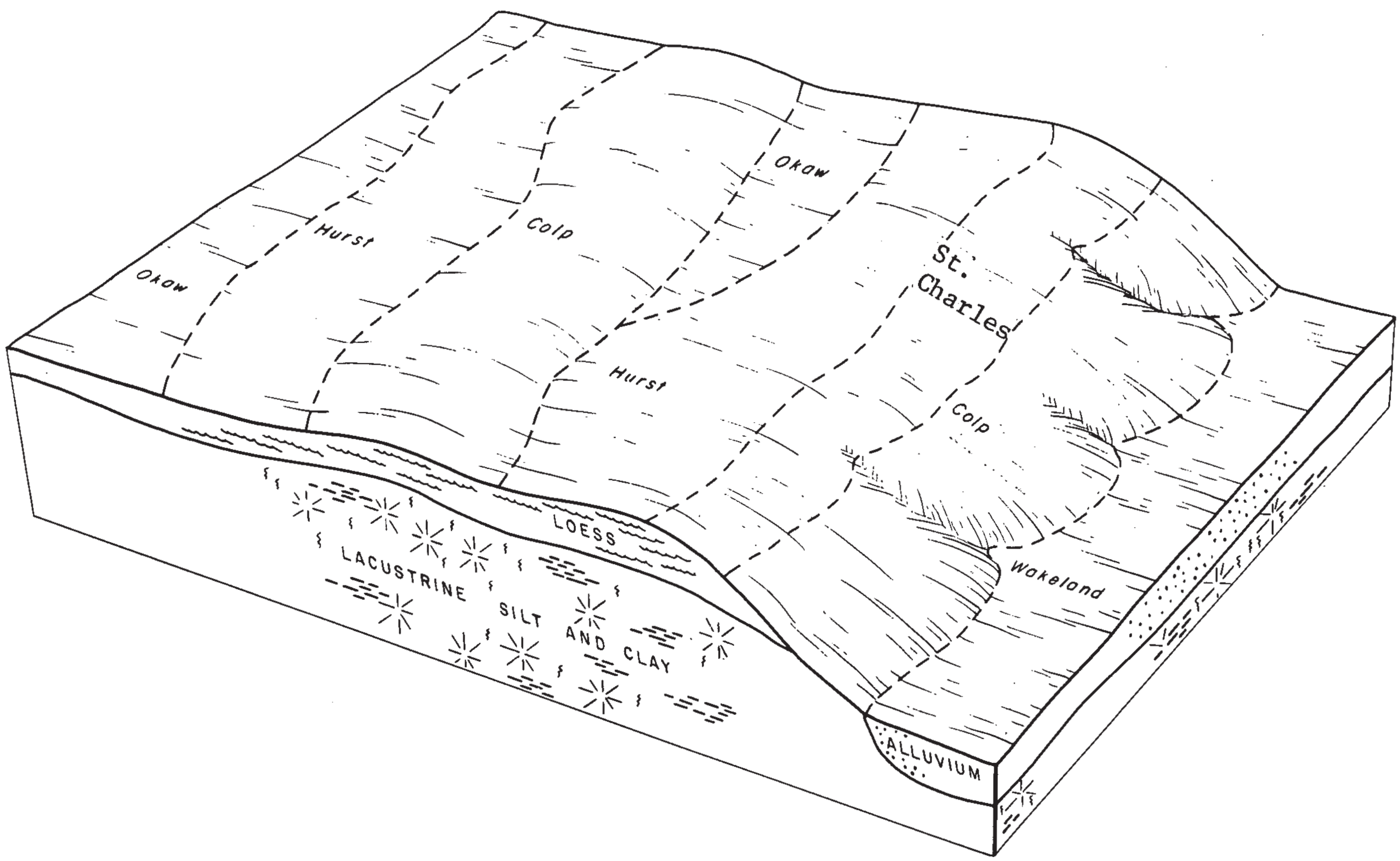

Figure 3.—Typical pattern of soils and underlying material in Hurst-Colp-St. Charles association.

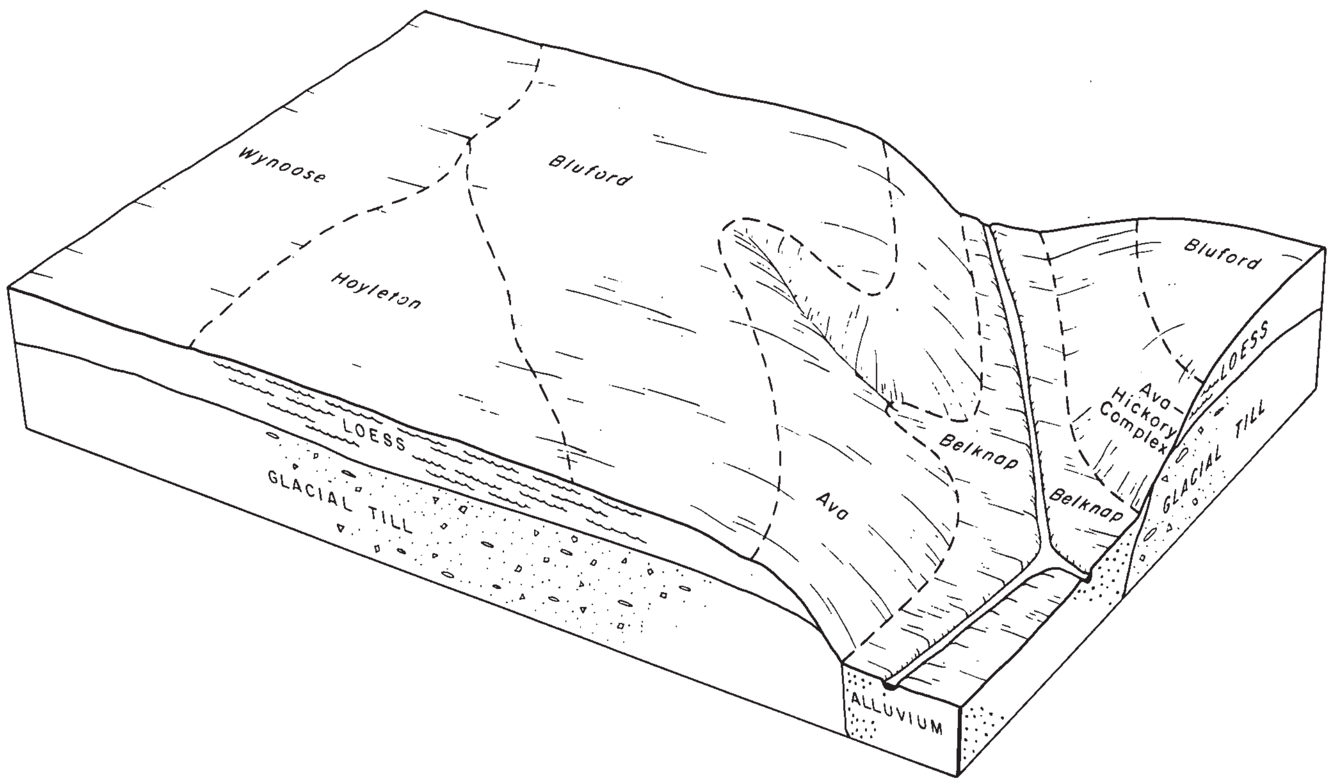

Figure 4.—Typical pattern of soils and underlying material in Bluford-Ava-Wynoose assocation.

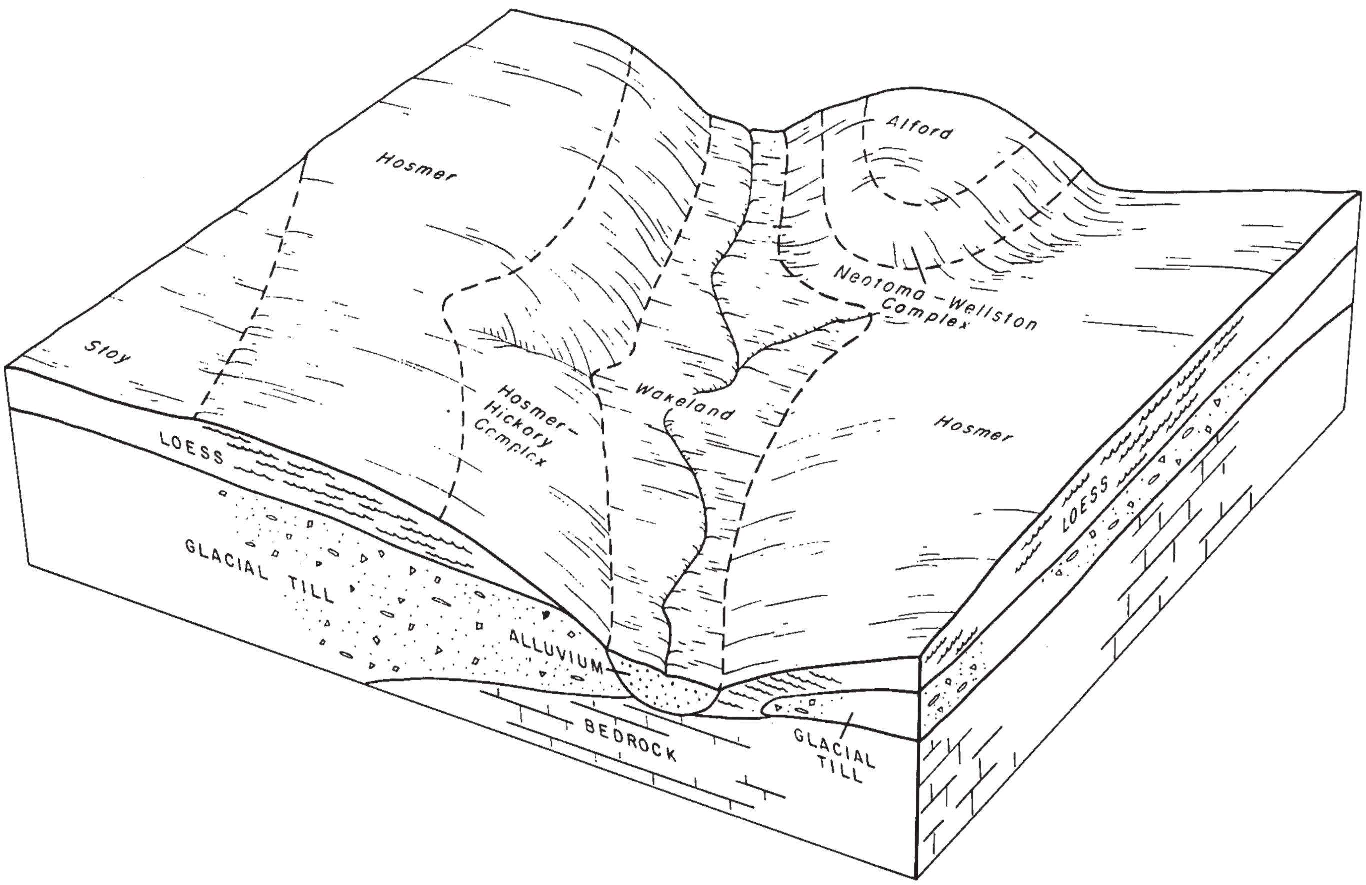

Figure 5.—Typical pattern of soils and underlying material in Hosmer association.

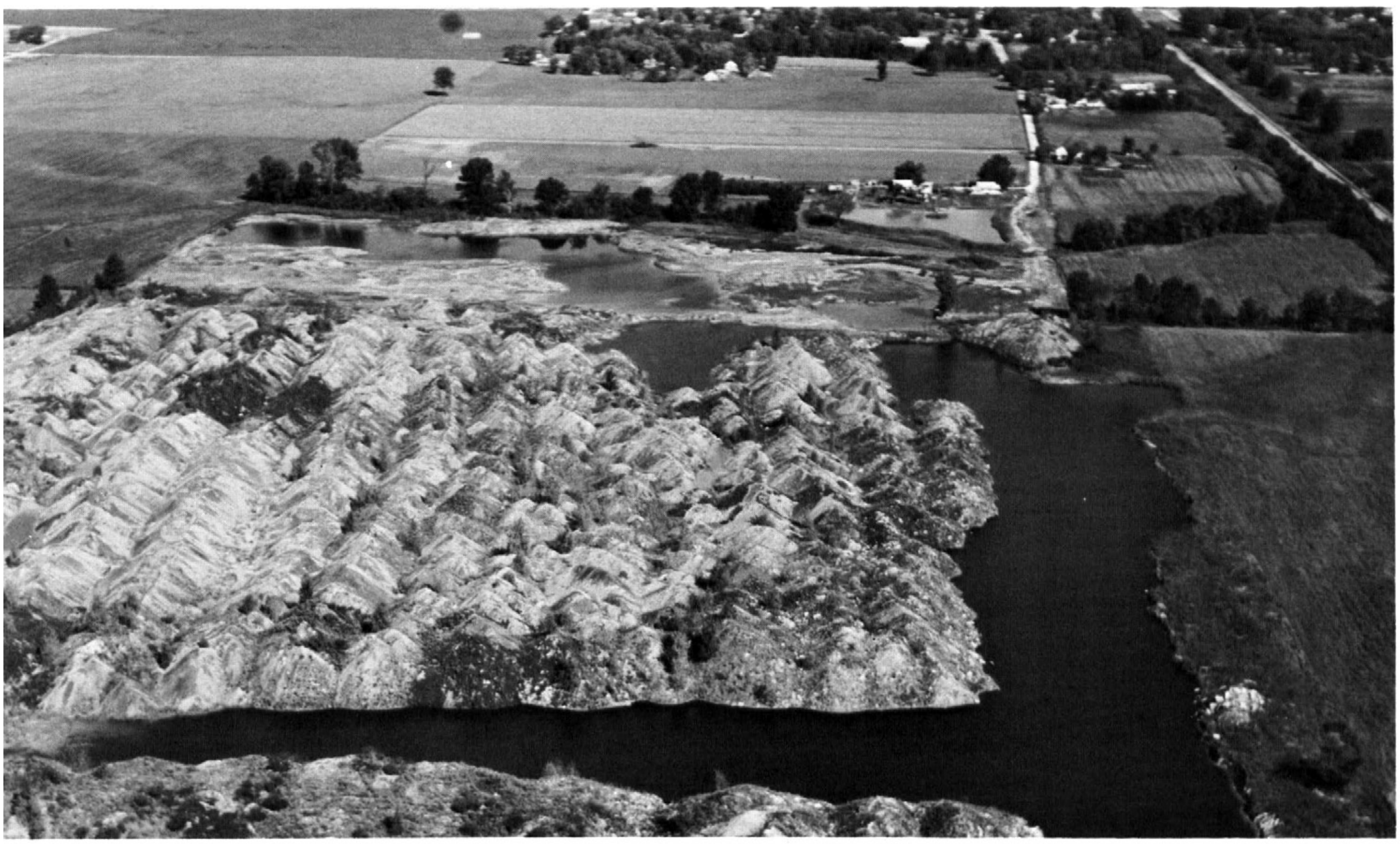

Figure 6.—Orthents, loamy soils, in an area of strip-mine spoil banks.

Figure 7.—A levee protects this area of Darwin silty clay, wet, from flooding by the Mississippi River. Nevertheless, narrow channels and sloughs in the area are ponded for extended periods.

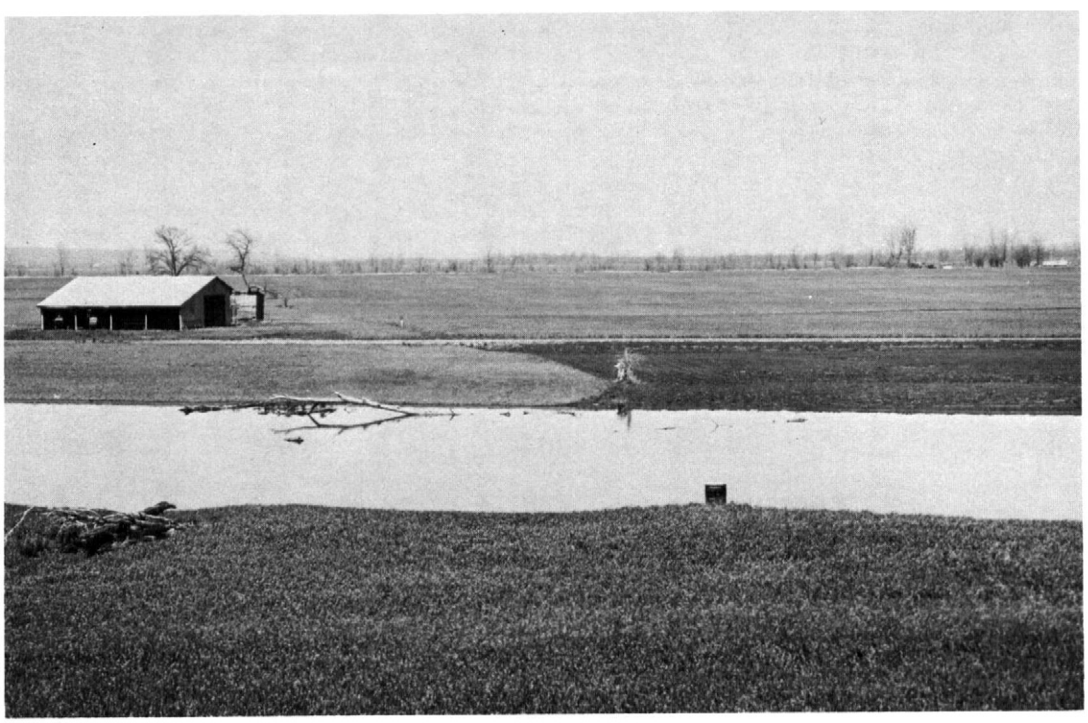

Figure 8.—Shallow ditches can adequately remove the perched water on this field of Okaw silt loam.

Figure 9.—Leveling and ditches can remove excess water in this area of Jacob clay.

Figure 10.—Orthents, loamy, hilly, used for pasture, is well suited to grasses and legumes if stones are removed.

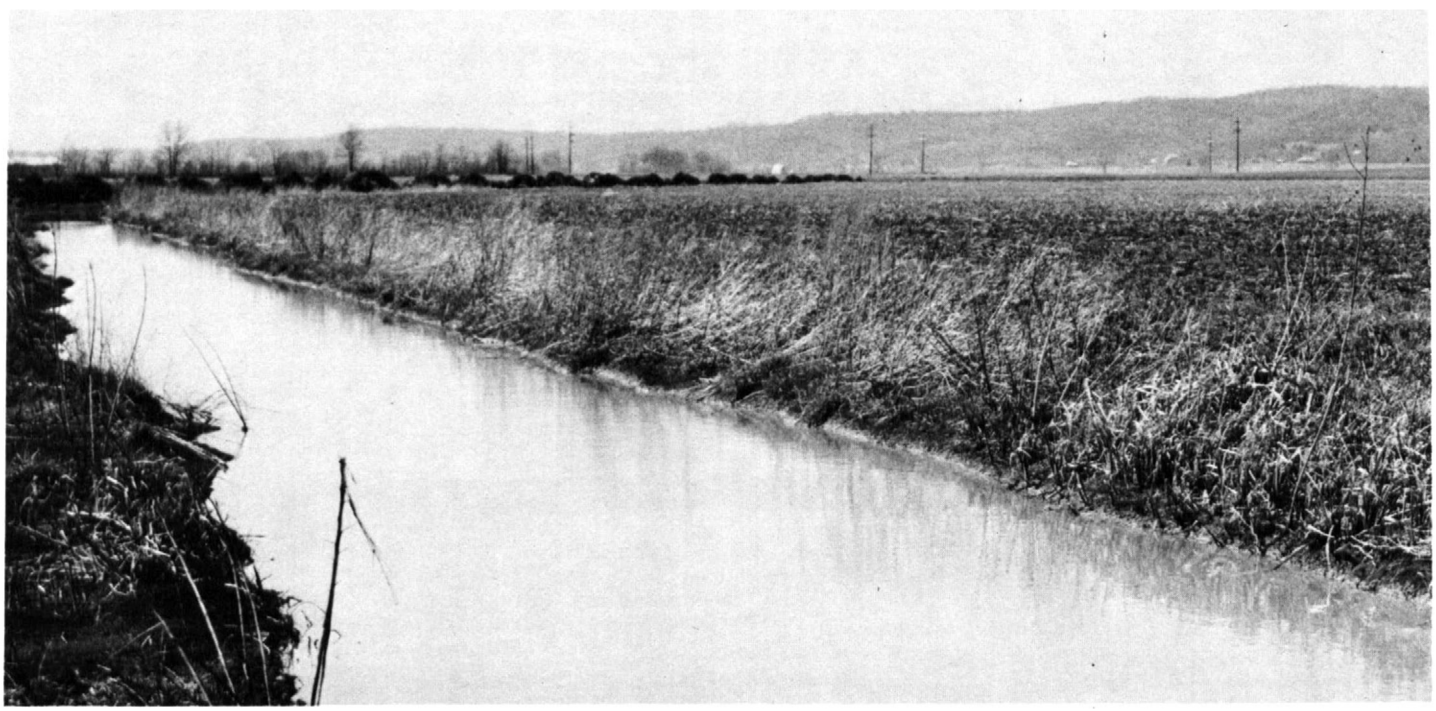

Figure 11. -Because drainage is the major problem on about one-third of the acreage, ditches are commonly used to remove excess water from clayey, slowly or very slowly permeable soils.

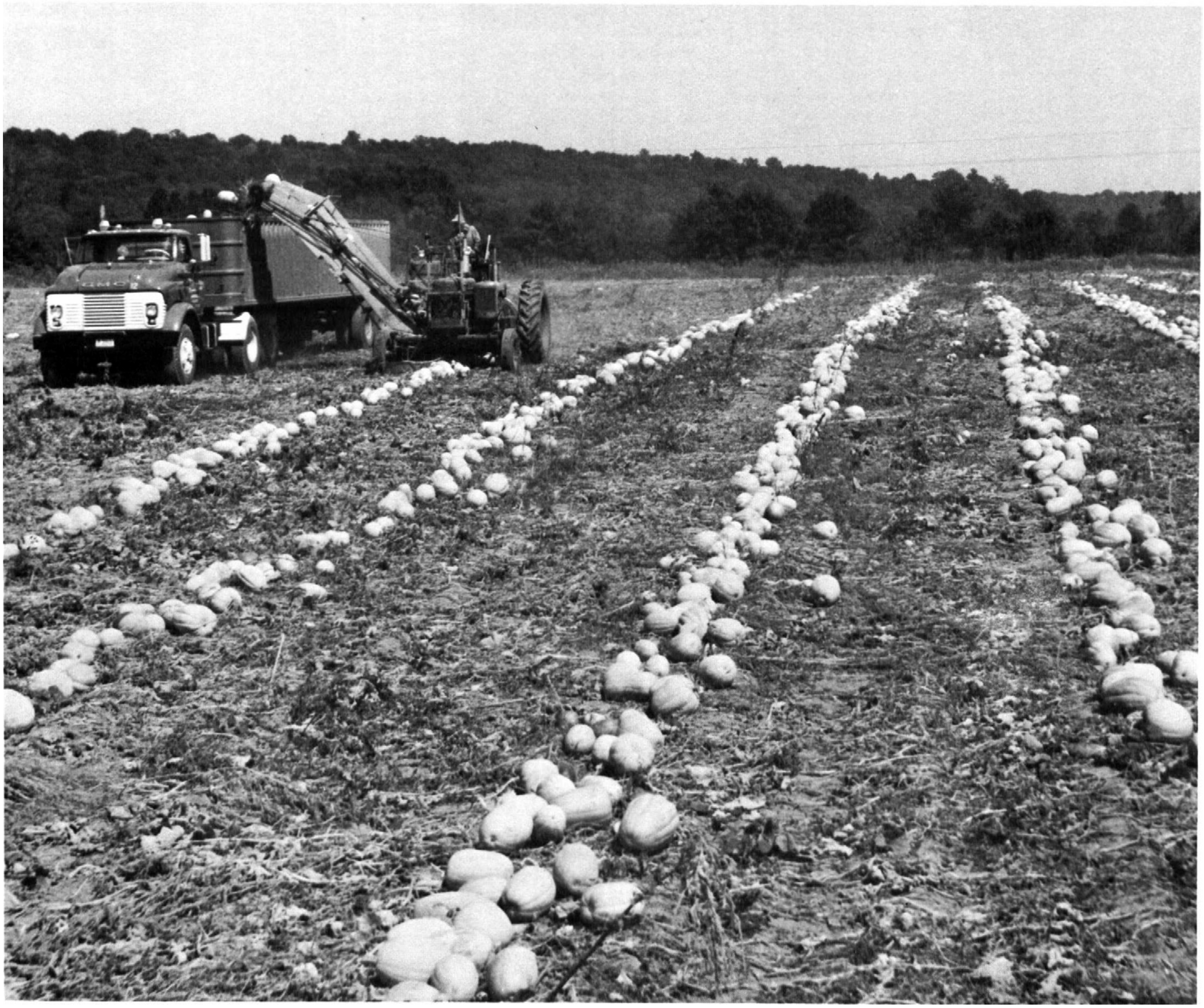

Figure 12.—Cairo silty clay, on the Mississippi River flood plain, is suited to corn, soybeans, wheat, and grasses and legumes, including pumpkins.

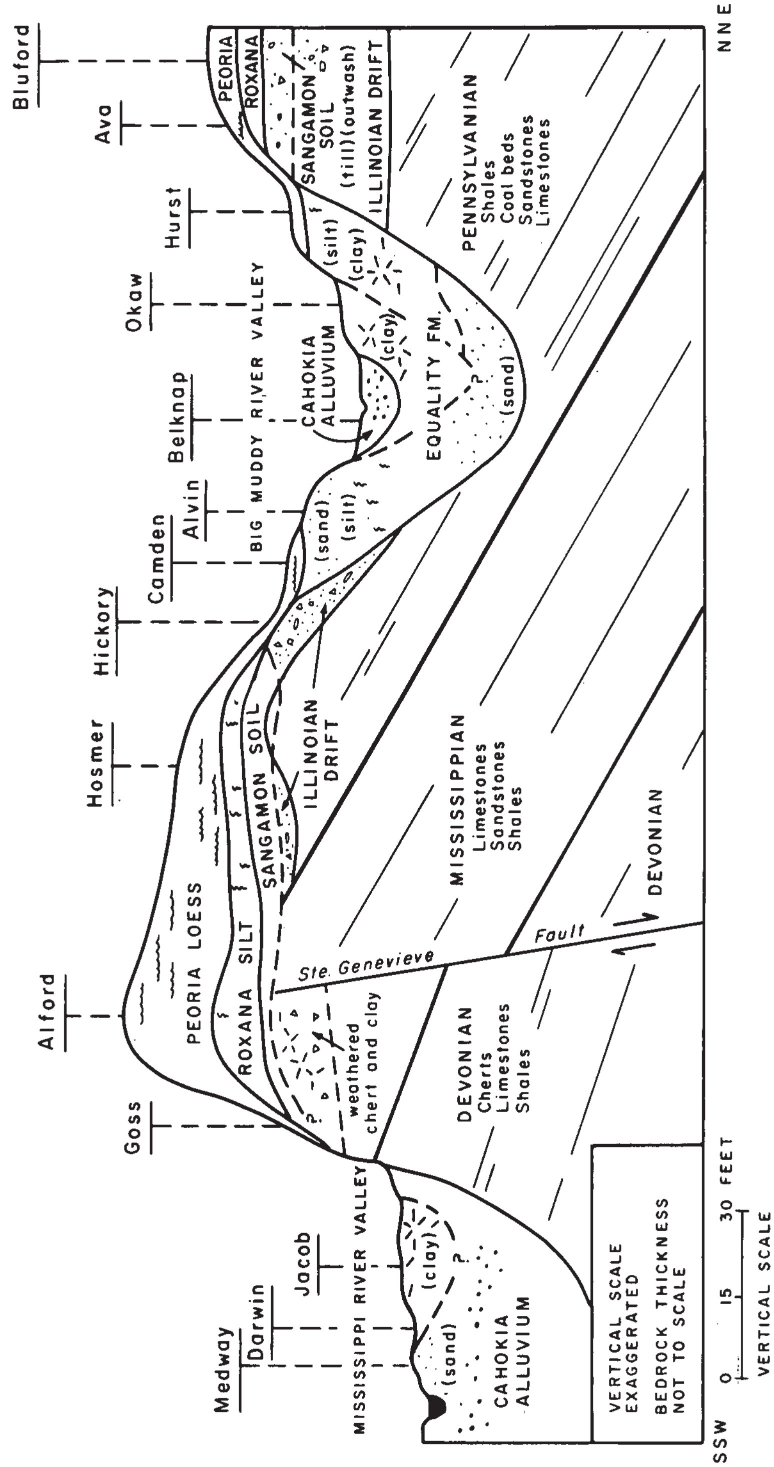

Figure 13.—Geologic cross section of Jackson County showing the position of some of the major soils.

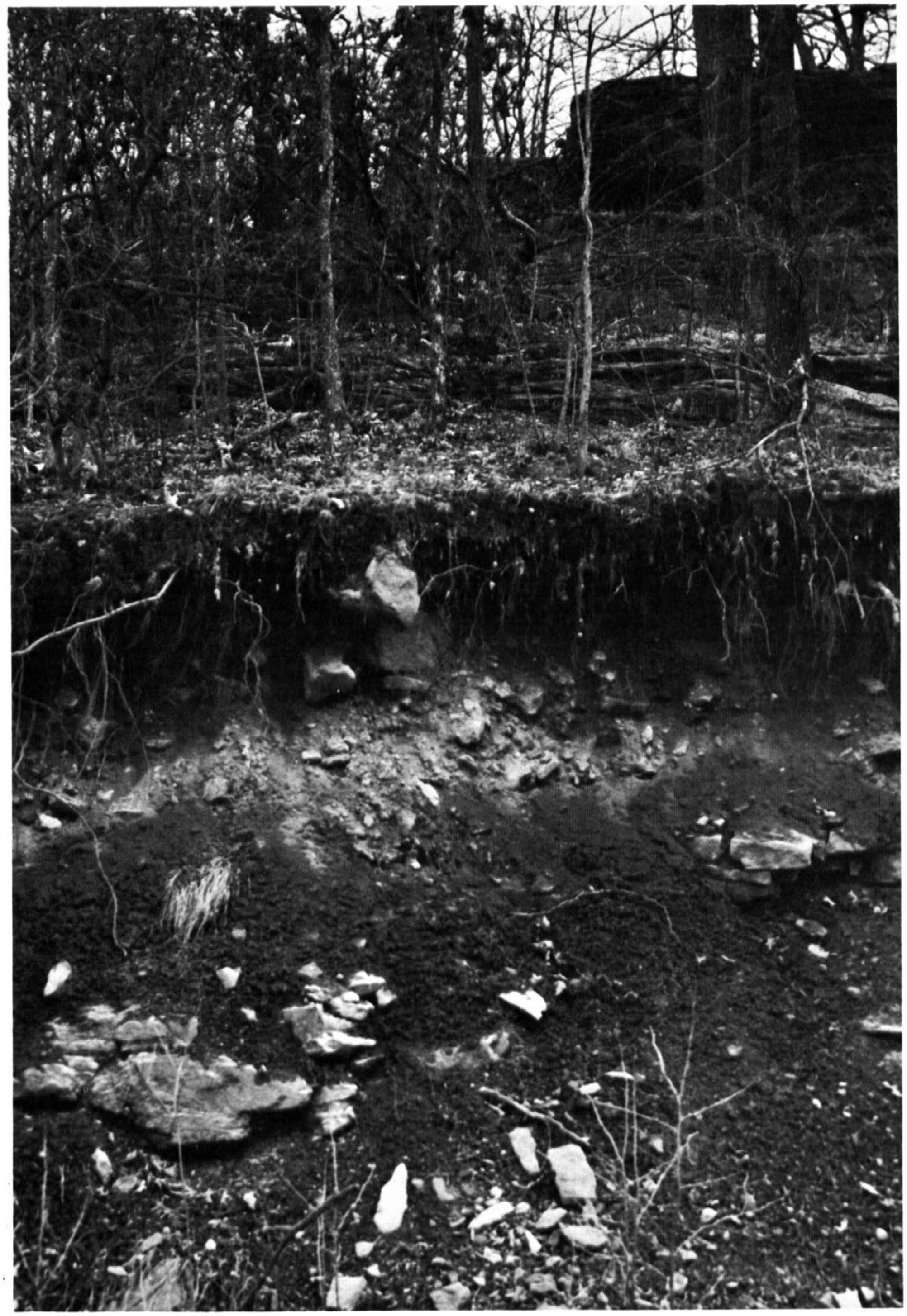

Figure 14.—Neotoma stony loam in a roadcut. This soil consists of more than 35 percent coarse fragments.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION DATA

Month	Temperature[1]						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[2]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	42.8	23.8	33.3	68	-5	37	2.76	1.44	3.83	6	3.1
February----	47.5	27.2	37.4	71	-1	82	2.92	1.57	4.01	6	3.0
March-------	56.6	34.7	45.7	81	11	250	4.24	2.29	5.83	8	2.5
April-------	69.5	45.9	57.7	88	24	531	4.19	2.63	5.59	8	.4
May---------	78.6	54.0	66.3	93	34	815	4.60	2.57	6.25	7	.0
June--------	86.9	62.8	74.9	99	46	1,047	3.93	2.60	5.13	6	.0
July--------	89.9	66.4	78.1	100	50	1,181	3.82	1.64	5.57	6	.0
August------	88.8	63.9	76.4	100	48	1,128	3.47	1.78	4.84	5	.0
September---	82.7	56.8	69.8	97	36	894	3.17	1.40	4.61	5	.0
October-----	72.5	45.0	58.8	91	25	583	2.33	1.00	3.43	4	.0
November----	57.2	34.9	46.1	79	13	204	3.69	1.81	5.21	6	.9
December----	46.0	28.1	37.0	70	2	99	3.34	1.61	4.74	7	2.0
Year------	68.3	45.3	56.8	102	-8	6,851	42.46	35.58	49.03	74	11.9

[1]Recorded in the period 1951-74 at Carbondale, Ill.

[2]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

Probability	Temperature[1]		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 8	April 14	April 26
2 years in 10 later than--	April 2	April 10	April 22
5 years in 10 later than--	March 22	April 3	April 13
First freezing temperature in fall:			
1 year in 10 earlier than--	October 26	October 17	October 5
2 years in 10 earlier than--	October 31	October 22	October 9
5 years in 10 earlier than--	November 8	October 29	October 17

[1]Recorded in the period 1951-74 at Carbondale, Ill.

TABLE 3.--GROWING SEASON LENGTH

Probability	Daily minimum temperature during growing season[1]		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	211	192	169
8 years in 10	218	197	175
5 years in 10	231	209	186
2 years in 10	244	220	197
1 year in 10	251	226	203

[1]Recorded in the period 1951-74 at Carbondale, Ill.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
3A	Hoyleton silt loam, 0 to 3 percent slopes	1,610	0.4
3B2	Hoyleton silt loam, 3 to 6 percent slopes, eroded	976	0.3
8E	Hickory silt loam, 18 to 30 percent slopes	2,886	0.7
8E3	Hickory soils, 15 to 30 percent slopes, severely eroded	434	0.1
8G	Hickory silt loam, 30 to 50 percent slopes	965	0.2
12	Wynoose silt loam	3,368	0.9
13A	Bluford silt loam, 0 to 2 percent slopes	2,331	0.6
13B	Bluford silt loam, 2 to 4 percent slopes	3,154	0.8
14B	Ava silt loam, 2 to 6 percent slopes	3,416	0.9
14C3	Ava silty clay loam, 6 to 12 percent slopes, severely eroded	484	0.1
71	Darwin silty clay	10,004	2.6
71+	Darwin silt loam	1,644	0.4
F71	Darwin silty clay, frequently flooded	1,337	0.3
W71	Darwin silty clay, wet	1,263	0.3
84	Okaw silt loam	12,728	3.2
85	Jacob clay	10,156	2.6
W85	Jacob clay, wet	4,464	1.2
108	Bonnie silt loam	8,374	2.2
109	Racoon silt loam	1,250	0.3
122A	Colp silt loam, 0 to 3 percent slopes	3,195	0.8
122B2	Colp silt loam, 3 to 7 percent slopes, eroded	3,126	0.8
122C2	Colp silt loam, 7 to 12 percent slopes, eroded	845	0.2
122C3	Colp silty clay loam, 7 to 15 percent slopes, severely eroded	8,550	2.2
122D	Colp silt loam, 12 to 20 percent slopes	1,248	0.3
131B	Alvin very fine sandy loam, 1 to 7 percent slopes	1,973	0.5
131C3	Alvin loam, 7 to 15 percent slopes, severely eroded	711	0.2
131E	Alvin very fine sandy loam, 12 to 25 percent slopes	372	0.1
132	Starks silt loam	2,938	0.8
134A	Camden silt loam, 0 to 3 percent slopes	2,402	0.6
134B2	Camden silt loam, 3 to 7 percent slopes, eroded	478	0.1
134C2	Camden silt loam, 7 to 12 percent slopes, eroded	372	0.1
134C3	Camden silty clay loam, 7 to 15 percent slopes, severely eroded	1,173	0.3
134D	Camden silt loam, 12 to 18 percent slopes	328	0.1
162	Gorham silty clay loam	1,675	0.4
164A	Stoy silt loam, 0 to 2 percent slopes	1,354	0.3
164B	Stoy silt loam, 2 to 4 percent slopes	4,119	1.1
164C2	Stoy silt loam, 4 to 7 percent slopes, eroded	1,812	0.5
165	Weir silt loam	802	0.2
180	Dupo silt loam	1,060	0.3
208	Sexton silt loam	1,399	0.4
214B	Hosmer silt loam, 2 to 7 percent slopes	32,080	8.3
214C2	Hosmer silt loam, 7 to 12 percent slopes, eroded	3,004	0.8
214C3	Hosmer silty clay loam, 7 to 12 percent slopes, severely eroded	17,310	4.5
214D2	Hosmer silt loam, 12 to 18 percent slopes, eroded	9,112	2.4
214D3	Hosmer silty clay loam, 12 to 18 percent slopes, severely eroded	1,291	0.3
243B	St. Charles silt loam, 2 to 7 percent slopes	4,514	1.2
308B2	Alford silt loam, 2 to 6 percent slopes, eroded	13,847	3.6
308C2	Alford silt loam, 6 to 12 percent slopes, eroded	5,874	1.5
308C3	Alford silty clay loam, 6 to 12 percent slopes, severely eroded	1,932	0.5
308D2	Alford silt loam, 12 to 18 percent slopes, eroded	2,263	0.6
308D3	Alford silty clay loam, 12 to 18 percent slopes, severely eroded	8,159	2.1
308E	Alford silt loam, 18 to 30 percent slopes	10,449	2.7
308E3	Alford silty clay loam, 18 to 30 percent slopes, severely eroded	3,553	0.9
308G	Alford silt loam, 30 to 50 percent slopes	5,150	1.3
331	Haymond silt loam	3,645	0.9
333	Wakeland silt loam	9,388	2.4
334	Birds silt loam	2,757	0.7
338A	Hurst silt loam, 0 to 2 percent slopes	11,847	3.1
338B2	Hurst silt loam, 2 to 6 percent slopes, eroded	5,361	1.4
382	Belknap silt loam	11,565	3.0
420	Piopolis silty clay loam	5,635	1.5
W420	Piopolis silty clay loam, wet	1,565	0.4
426	Karnak silty clay	2,247	0.6
427	Burnside silt loam	3,237	0.8
428	Coffeen silt loam	716	0.2
430A	Raddle silt loam	1,303	0.3
456	Ware loam	1,681	0.4
F456	Ware sandy loam, frequently flooded	1,161	0.3
457	Booker silty clay	4,616	1.2
W457	Booker silty clay, wet	1,368	0.4
533	Urban land	844	0.2
589	Bowdre silty clay	1,284	0.3

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
590	Cairo silty clay	5,328	1.4
682	Medway silty clay loam	3,493	0.9
F682	Medway soils, frequently flooded	2,736	0.7
787	Banlic silt loam	3,673	0.9
801	Orthents, silty, sloping	1,711	0.4
802C	Orthents, loamy, hilly	1,040	0.3
802G	Orthents, loamy, very steep	4,295	1.1
805	Orthents, clayey, sloping	2,386	0.6
850D	Hosmer-Hickory silt loams, 12 to 18 percent slopes	899	0.2
850D3	Hosmer-Hickory complex, 12 to 18 percent slopes, severely eroded	6,874	1.8
850E	Hickory-Hosmer silt loams, 18 to 30 percent slopes	1,265	0.3
850E3	Hickory-Hosmer complex, 18 to 30 percent slopes, severely eroded	479	0.1
852E	Alford-Wellston silt loams, 15 to 30 percent slopes	21,130	5.5
852G	Alford-Wellston silt loams, 30 to 50 percent slopes	2,206	0.6
929C3	Ava-Hickory complex, 7 to 12 percent slopes, severely eroded	1,024	0.3
929D2	Hickory-Ava silt loams, 12 to 18 percent slopes, eroded	279	0.1
930G	Goss-Alford complex, 25 to 65 percent slopes	1,094	0.3
976G	Neotoma-Rock outcrop complex, 25 to 55 percent slopes	2,281	0.6
977E	Neotoma-Wellston complex, 18 to 30 percent slopes	1,082	0.3
977G	Neotoma-Wellston complex, 30 to 50 percent slopes	6,069	1.6
999D	Alford-Hickory silt loams, 12 to 18 percent slopes	1,006	0.3
999D3	Alford-Hickory complex, 12 to 18 percent slopes, severely eroded	2,725	0.7
999E	Hickory-Alford silt loams, 18 to 30 percent slopes	8,047	2.1
999E3	Hickory-Alford complex, 18 to 30 percent slopes, severely eroded	1,221	0.3
MD	Mine dump	326	0.1
QU	Quarry	74	(1)
SL	Sewage lagoon	76	(1)
W	Water	4,847	1.3
	Total	387,200	100.0

[1]Less than 0.1 percent.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. The estimates were made in 1975. Absence of data indicates that the soil is not suited to the crop or the crop generally is not grown on the soil.]

Soil name and map symbol	Corn	Soybeans	Wheat, winter	Oats	Grass-legume hay	Grass-clover
	Bu	Bu	Bu	Bu	Ton	AUM[1]
Hoyleton:						
3A	105	40	50	---	4.5	7.5
3B2	105	40	50	---	4.5	7.5
Hickory:						
8E, 8E3	---	---	---	---	2.2	3.4
8G	---	---	---	---	---	3.4
Wynoose:						
12	85	28	38	---	3.5	5.5
Bluford:						
13A	95	32	42	---	3.8	5.9
13B	95	32	42	---	3.8	5.9
Ava:						
14B	90	30	40	---	3.8	6.0
14C3	60	---	28	---	2.5	4.2
Darwin:						
[2]71, [2]71+	90	32	38	---	3.0	4.5
[2]F71	70	28	---	---	---	---
W71	---	---	---	---	---	---
Okaw:						
84	73	25	36	49	2.8	3.4
Jacob:						
85	55	23	24	33	2.0	3.3
W85	---	---	---	---	---	---
Bonnie:						
108	90	32	40	---	3.8	5.5
Racoon:						
109	94	32	42	---	3.5	5.8
Colp:						
122A	72	30	37	52	3.3	5.5
122B2	60	22	28	40	2.8	4.8
122C2	---	---	---	---	2.8	4.8
122C3	---	---	---	---	2.5	4.5
122D	---	---	---	---	2.7	4.8
Alvin:						
131B	80	27	38	57	3.5	5.5
131C3	75	24	35	53	3.2	5.2
131E	70	---	---	50	3.0	5.0
Starks:						
132	112	36	---	65	4.6	7.2

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Soybeans	Wheat, winter	Oats	Grass-legume hay	Grass-clover
	Bu	Bu	Bu	Bu	Ton	AUM[1]
Camden:						
134A	110	38	---	65	5.0	8.3
134B2	100	35	---	55	4.5	7.5
134C2, 134C3	95	32	---	55	4.2	7.0
134D	80	---	---	50	4.0	6.6
Gorham:						
[2]162	115	40	---	---	4.5	7.0
Stoy:						
164A	97	32	---	---	4.1	7.0
164B, 164C2	93	28	---	---	4.0	6.5
Weir:						
165	90	31	39	---	3.5	5.5
Dupo:						
180	112	37	46	---	4.3	7.0
Sexton:						
208	104	34	42	59	3.9	6.0
Hosmer:						
214B	105	37	47	---	3.4	6.2
214C2	85	30	38	---	2.8	5.6
214C3	75	26	34	---	2.5	5.0
214D2	70	24	32	---	2.3	4.6
214D3	---	---	27	---	2.0	4.0
St. Charles:						
243B	112	38	47	66	4.6	8.0
Alford:						
308B2	120	42	48	---	4.0	7.5
308C2	110	38	44	---	3.6	7.0
308C3	105	37	42	---	3.4	6.5
308D2	95	33	38	---	3.1	6.5
308D3	---	---	---	---	3.0	6.0
308E	---	---	---	---	1.5	5.0
308E3, 308G	---	---	---	---	2.6	3.0
Haymond:						
331	90	34	35	---	3.2	7.3
Wakeland:						
333	135	47	54	---	4.4	8.0
Birds:						
334	115	39	45	---	4.3	6.6
Hurst:						
338A	76	29	39	---	3.3	5.5
338B2	63	25	27	---	3.1	5.0

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Soybeans	Wheat, winter	Oats	Grass-legume hay	Grass-clover
	Bu	Bu	Bu	Bu	Ton	AUM[1]
Belknap: 382	105	38	48	---	4.5	7.0
Piopolis: 420, W420	90	32	---	---	3.8	6.3
Karnak: 426	---	---	---	---	1.0	3.4
Burnside: 427	82	29	---	48	3.5	6.0
Coffeen: [2]428	130	42	52	73	4.0	5.6
Raddle: 430A	130	45	55	80	5.5	8.0
Ware: [2]456	98	34	44	63	3.1	6.2
[2]F456	80	30	---	---	4.1	6.2
Booker: [2]457, W457	55	25	28	---	2.5	5.0
Urban land: 533.						
Bowdre: [2]589	65	35	---	---	4.0	6.5
Cairo: 590	103	36	38	55	3.8	4.8
Medway: 682, F682	98	34	---	---	3.5	6.2
Banlic: 787	105	38	50	---	4.3	6.8
Orthents, silty: 801	70	20	---	---	3.8	7.0
Orthents, loamy: 802C	---	---	---	---	3.5	6.3
802G	---	---	---	---	---	---
Orthents, clayey: 805	---	---	---	---	3.0	5.6
Hosmer: [3]850D	70	---	32	---	2.3	5.3
[3]850D3	---	---	---	---	---	4.0
Hickory: [3]850E	---	---	---	---	2.3	3.4
[3]850E3	---	---	---	---	2.3	3.0
Alford: [3]852E	---	---	---	---	---	6.0
[3]852G	---	---	---	---	---	4.0
Ava: [3]929C3	---	---	---	---	2.4	4.2

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Soybeans	Wheat, winter	Oats	Grass-legume hay	Grass-clover
	Bu	Bu	Bu	Bu	Ton	AUM[1]
Hickory:						
[3]929D2	---	---	---	---	---	3.2
Goss:						
[3]930G	---	---	---	---	---	4.0
Neotoma:						
[4]976G	---	---	---	---	---	3.5
[3]977E	---	---	---	---	---	3.8
[3]977G	---	---	---	---	---	3.5
Alford:						
[3]999D	---	---	---	---	---	6.5
[3]999D3	---	---	---	---	---	6.0
Hickory:						
[3]999E	---	---	---	---	3.4	3.4
[3]999E3	---	---	---	---	3.0	3.0
Mine dump:						
M.D.						
Quarry:						
Qu.						

[1]Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for a period of 30 days.
[2]Yields are for areas protected from flooding.
[3]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior characteristics of the mapping unit.
[4]Yields are for Neotoma part only.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed in this table. Absence of an entry in a column indicates that the information was not available]

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Hoyleton:								
3A, 3B2	3o	Slight	Slight	Slight	Slight	White oak	70	Shortleaf pine,
						Northern red oak	70	loblolly pine,
						Green ash	---	eastern white pine,
						Bur oak	---	eastern redcedar.
Hickory:								
8E, 8E3	1r	Moderate	Moderate	Slight	Slight	White oak	85	Eastern white pine,
						Northern red oak	85	red pine,
						Black oak	---	yellow-poplar,
						Green ash	---	sugar maple,
						Bitternut hickory	---	white oak,
						Yellow-poplar	95	black walnut.
8G	1r	Severe	Severe	Slight	Slight	White oak	85	Eastern white pine,
						Northern red oak	85	red pine,
						Black oak	---	yellow-poplar,
						Green ash	---	sugar maple,
						Bitternut hickory	---	white oak,
						Yellow-poplar	95	black walnut.
Wynoose:								
12	4w	Slight	Moderate	Moderate	Slight	Pin oak	70	Baldcypress,
						White oak	---	pin oak,
						Black oak	---	water tupelo,
								red maple.
Bluford:								
13A, 13B	3o	Slight	Slight	Slight	Slight	White oak	70	Shortleaf pine,
						Northern red oak	70	loblolly pine,
						Southern red oak	70	eastern white pine,
						Green ash	---	eastern redcedar.
						Bur oak	---	
Ava:								
14B, 14C3	2o	Slight	Slight	Slight	Slight	White oak	75	Black walnut,
						Northern red oak	80	eastern cottonwood,
						Yellow-poplar	90	sweetgum,
						Black walnut	---	yellow-poplar,
								white oak,
								American sycamore.
Darwin:								
71, 71+, F71, W71	3w	Slight	Severe	Severe	Slight	Pin oak	80	Eastern cottonwood,
						Swamp white oak	---	American sycamore,
						Eastern cottonwood	---	red maple,
						Green ash	---	green ash,
						American sycamore	---	pin oak.
Okaw:								
84	4w	Slight	Moderate	Moderate	Slight	Pin oak	70	Pin oak,
						Blackjack oak	60	baldcypress,
						Black oak	55	green ash,
								water tupelo,
								red maple,
								swamp white oak.
Jacob:								
85, W85	3w	Slight	Severe	Severe	Moderate	Pin oak	80	Eastern cottonwood,
						Swamp white oak	---	pin oak,
						Eastern cottonwood	---	green ash,
						American sycamore	---	American sycamore.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Important trees	Site index	Trees to plant
Bonnie:								
108	2w	Slight	Moderate	Moderate	Severe	Pin oak	90	Eastern cottonwood,
						Eastern cottonwood	100	red maple,
						Sweetgum	---	American sycamore,
						Cherrybark oak	---	sweetgum,
						American sycamore	---	baldcypress,
								pin oak.
Racoon:								
109	3w	Slight	Moderate	Moderate	Slight	Pin oak	80	Baldcypress,
						Post oak	80	pin oak,
						Green ash	---	water tupelo,
						White oak	---	red maple.
Colp:								
122A, 122B2, 122C2	3o	Slight	Slight	Slight	Slight	White oak	70	Shortleaf pine,
						Northern red oak	70	loblolly pine,
						White ash	---	eastern white pine,
						Bur oak	70	eastern redcedar.
122C3, 122D	3r	Moderate	Moderate	Moderate	Slight	White oak	70	Shortleaf pine,
						Northern red oak	70	loblolly pine,
						White ash	---	eastern white pine,
						Bur oak	70	eastern redcedar.
Alvin:								
131B, 131C3	2o	Slight	Slight	Slight	Slight	White oak	80	Green ash,
						Northern red oak	80	black walnut,
						Black walnut	---	yellow-poplar,
						Yellow-poplar	90	white oak,
								eastern white pine,
								American sycamore,
								sugar maple.
131E	2r	Moderate	Moderate	Slight	Slight	White oak	80	Green ash,
						Northern red oak	80	black walnut,
						Black walnut	---	yellow-poplar,
						Yellow-poplar	90	white oak,
								eastern white pine,
								American sycamore,
								sugar maple.
Starks:								
132	2o	Slight	Slight	Slight	Slight	White oak	80	Black walnut,
						Northern red oak	80	American sycamore,
						Yellow-poplar	90	yellow-poplar,
						Black walnut	---	white oak,
								green ash,
								sugar maple.
Camden:								
134A, 134B2, 134C2, 134C3	1o	Slight	Slight	Slight	Slight	Yellow-poplar	95	White oak,
						White oak	85	black walnut,
						Northern red oak	85	green ash,
						Sweetgum	---	eastern white pine,
						Green ash	---	red pine,
								yellow-poplar,
								black locust,
								white ash.
134D	1r	Moderate	Moderate	Slight	Slight	Yellow-poplar	95	White oak,
						White oak	85	black walnut,
						Northern red oak	85	green ash,
						Sweetgum	---	eastern white pine,
						Green ash	---	red pine,
								yellow-poplar,
								black locust,
								white ash.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Important trees	Potential productivity: Site index	Trees to plant
Gorham:								
162	2w	Slight	Moderate	Moderate	Slight	Pin oak	90	Eastern cottonwood,
						Eastern cottonwood	100	red maple,
						Sweetgum	---	American sycamore,
						Cherrybark oak	---	pin oak,
						American sycamore	---	sweetgum.
Stoy:								
164A, 164B, 164C2	3o	Slight	Slight	Slight	Slight	White oak	70	Shortleaf pine,
						Southern red oak	70	loblolly pine,
						White ash	---	eastern white pine,
						Bur oak	---	Scotch pine,
								eastern redcedar.
Weir:								
165	4w	Slight	Moderate	Moderate	Slight	Pin oak	70	Baldcypress,
						White oak	---	pin oak,
						Black oak	---	water tupelo,
						Pignut hickory	---	red maple.
Dupo:								
180	---	---	---	---	---		---	Black walnut,
								American sycamore,
								eastern cottonwood,
								green ash,
								yellow-poplar,
								red maple,
								cherrybark oak.
Sexton:								
208	3w	Slight	Moderate	Moderate	Slight	Pin oak	80	Baldcypress,
						White oak	---	pin oak,
						Green ash	---	water tupelo,
						Yellow-poplar	80	red maple.
Hosmer:								
214B, 214C2, 214C3	2o	Slight	Slight	Slight	Slight	White oak	75	Eastern white pine,
						Yellow-poplar	90	shortleaf pine,
						Virginia pine	75	red pine,
						Sugar maple	75	yellow-poplar,
								white ash.
214D2, 214D3	2r	Moderate	Moderate	Slight	Slight	White oak	75	Eastern white pine,
						Yellow-poplar	90	shortleaf pine,
						Virginia pine	75	red pine,
						Sugar maple	75	yellow-poplar,
								white ash.
St. Charles:								
243B	1o	Slight	Slight	Slight	Slight	Yellow-poplar	95	White oak,
						White oak	85	black walnut,
						Northern red oak	85	sugar maple,
						Sweetgum	---	eastern white pine,
						Green ash	---	red pine.
Alford:								
308B2, 308C2, 308C3, 308D2, 308D3	1o	Slight	Slight	Slight	Slight	White oak	90	Eastern white pine,
						Yellow-poplar	98	red pine,
						Sweetgum	76	black walnut,
								yellow-poplar,
								white ash,
								black locust.
308E, 308E3	1r	Moderate	Moderate	Slight	Slight	White oak	90	Eastern white pine,
						Yellow-poplar	98	red pine,
						Sweetgum	76	black walnut,
								yellow-poplar,
								white ash,
								black locust.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Important trees	Site index	Trees to plant
Alford:								
308G	1r	Severe	Severe	Slight	Slight	White oak	90	Eastern white pine,
						Yellow-poplar	98	red pine,
						Sweetgum	76	black walnut,
								yellow-poplar,
								white ash,
								black locust.
Haymond:								
331	1o	Slight	Slight	Slight	Slight	Yellow-poplar	100	Eastern white pine,
						White oak	90	black walnut,
						Black walnut	70	yellow-poplar,
								black locust.
Wakeland:								
333	2w	Slight	Moderate	Slight	Slight	Pin oak	90	Eastern white pine,
						Sweetgum	85	baldcypress,
						Yellow-poplar	90	American sycamore,
						Virginia pine	90	red maple,
								white ash.
Birds:								
334	2w	Slight	Severe	Moderate	Slight	Eastern cottonwood	100	Eastern cottonwood,
						Pin oak	90	red maple,
						Sweetgum	---	American sycamore,
						Cherrybark oak	---	baldcypress,
						American sycamore	---	water tupelo.
Hurst:								
338A, 338B2	3o	Slight	Slight	Slight	Slight	White oak	70	Shortleaf pine,
						Southern red oak	70	loblolly pine,
						White ash	---	eastern white pine,
						Bur oak	---	eastern redcedar.
Belknap:								
382	2o	Slight	Slight	Slight	Slight	Eastern cottonwood	100	Eastern cottonwood,
						American sycamore	---	red maple,
						Yellow-poplar	90	American sycamore,
						Sweetgum	---	sweetgum,
						Pin oak	90	baldcypress.
Piopolis:								
420, W420	2w	Slight	Severe	Moderate	Slight	Pin oak	90	Eastern cottonwood,
						Eastern cottonwood	100	red maple,
						Sweetgum	---	American sycamore,
						Cherrybark oak	---	sweetgum,
						American sycamore	---	pin oak,
						Post oak	---	baldcypress.
Karnak:								
426	3w	Slight	Moderate	Severe	Slight	Pin oak	90	Pin oak,
						Swamp white oak	---	swamp white oak,
						Eastern cottonwood	----	eastern cottonwood,
						Green ash	---	green ash,
						Silver maple	---	red maple,
								baldcypress,
								sweetgum,
								water tupelo,
								pecan.
Burnside:								
427	1o	Slight	Slight	Slight	Slight	Eastern cottonwood	105	Black walnut,
						Yellow-poplar	95	American sycamore,
						American sycamore	---	eastern cottonwood,
						Cherrybark oak	---	pin oak,
						Sweetgum	---	red maple.
						Southern red oak	---	

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Coffeen:								
428	2w	Slight	Moderate	Slight	Slight	Eastern cottonwood Yellow-poplar Pin oak American sycamore Sweetgum	100 90 90 --- ---	Eastern cottonwood, yellow-poplar, pin oak, American sycamore, sweetgum, red maple.
Raddle:								
430A	---	---------	---------	---------	---------		---	Black walnut, green ash, yellow-poplar, red maple, eastern cottonwood.
Ware:								
456, F456	---	---------	---------	---------	---------		---	Eastern cottonwood, yellow-poplar, American sycamore, black walnut, sweetgum, green ash, eastern white pine.
Booker:								
457, W457	4w	Slight	Severe	Severe	Severe	Eastern cottonwood	85	Eastern cottonwood, pin oak, pecan, green ash, sweetgum, willow oak, baldcypress, silver maple.
Bowdre:								
589	2w	Slight	Severe	Moderate	Slight	Cherrybark oak Eastern cottonwood Sweetgum Water oak	90 110 95 95	Eastern cottonwood, sweetgum, American sycamore.
Cairo:								
590	2w	Slight	Moderate	Severe	Slight	Pin oak Baldcypress Swamp white oak Eastern cottonwood Green ash	90 --- --- --- ---	Pin oak, baldcypress, eastern cottonwood, red maple, water tupelo.
Medway:								
682, F682	2w	Slight	Severe	Severe	Severe	Northern red oak Yellow-poplar Sugar maple Eastern white pine	80 90 80 90	Eastern white pine, yellow-poplar.
Banlic:								
787	2o	Slight	Slight	Slight	Slight	White oak Pin oak Southern red oak Yellow-poplar Black walnut	75 90 85 90 ---	Black walnut, sweetgum, white oak, yellow-poplar, American sycamore, green ash.
Orthents, silty:								
801	---	---------	---------	---------	---------		---	Yellow-poplar, eastern white pine, shortleaf pine, white oak, black walnut, American sycamore, Scotch pine.

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Orthents, loamy:								
802C, 802G	---	---	---	---	---		---	Shortleaf pine, eastern white pine, eastern redcedar, eastern cottonwood, Amur maple.
Hosmer:								
[1]850D:								
Hosmer part	2r	Moderate	Moderate	Slight	Slight	White oak Yellow-poplar Virginia pine Sugar maple	75 90 75 75	Eastern white pine, shortleaf pine, red pine, yellow-poplar, white ash.
Hickory part	1r	Moderate	Moderate	Slight	Slight	White oak Northern red oak Black oak Green ash Bitternut hickory Yellow-poplar	85 85 --- --- --- 95	Eastern white pine, red pine, yellow-poplar, sugar maple, white oak, black walnut.
[1]850D3:								
Hosmer part	2r	Moderate	Moderate	Slight	Slight	White oak Yellow-poplar Virginia pine Sugar maple	75 90 75 75	Eastern white pine, shortleaf pine, red pine, yellow-poplar, white ash.
Hickory part	1r	Moderate	Moderate	Slight	Slight	White oak Northern red oak Black oak Green ash Bitternut hickory Yellow-poplar	85 85 --- --- --- 95	Eastern white pine, red pine, yellow-poplar, sugar maple, white oak, black walnut.
Hickory:								
[1]850E:								
Hickory part	1r	Moderate	Moderate	Slight	Slight	White oak Northern red oak Black oak Green ash Bitternut hickory Yellow-poplar	85 85 --- --- --- 95	Eastern white pine, red pine, yellow-poplar, sugar maple, white oak, black walnut.
Hosmer part	2r	Moderate	Moderate	Slight	Slight	White oak Yellow-poplar Virginia pine Sugar maple	75 90 75 75	Eastern white pine, shortleaf pine, red pine, yellow-poplar, white ash.
[1]850E3:								
Hickory part	1r	Moderate	Moderate	Slight	Slight	White oak Northern red oak Black oak Green ash Bitternut hickory Yellow-poplar	85 85 --- --- --- 95	Eastern white pine, red pine, yellow-poplar, sugar maple, white oak, black walnut.
Hosmer part	2r	Moderate	Moderate	Slight	Slight	White oak Yellow-poplar Virginia pine Sugar maple	75 90 75 75	Eastern white pine, shortleaf pine, red pine, yellow-poplar, white ash.

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Important trees	Potential productivity: Site index	Trees to plant
Alford:								
[1]852E:								
Alford part	1r	Moderate	Moderate	Slight	Slight	White oak Yellow-poplar Sweetgum	90 98 76	Eastern white pine, red pine, black walnut, yellow-poplar, white ash, black locust.
Wellston part	2r	Moderate	Moderate	Slight	Slight	Northern red oak Yellow-poplar Virginia pine	81 97 76	Eastern white pine, black walnut, yellow poplar.
[1]852G:								
Alford part	1r	Severe	Severe	Slight	Slight	White oak Yellow-poplar Sweetgum	90 98 76	Eastern white pine, red pine, black walnut, yellow-poplar, white ash, black locust.
Wellston part	2r	Severe	Severe	Slight	Slight	Northern red oak Yellow-poplar Virginia pine	81 97 76	Eastern white pine, black walnut, yellow-poplar.
Ava:								
[1]929C3:								
Ava part	2o	Slight	Slight	Slight	Slight	White oak Northern red oak Yellow-poplar Black walnut	75 80 90 ---	Black walnut, eastern cottonwood, sweetgum, yellow-poplar, white oak, American sycamore.
Hickory part	1o	Slight	Slight	Slight	Slight	White oak Northern red oak Black oak Green ash Bitternut hickory Yellow-poplar	85 85 --- --- --- 95	Eastern white pine, red pine, yellow-poplar, sugar maple, white oak, black walnut.
Hickory:								
[1]929D2:								
Hickory part	1r	Moderate	Moderate	Slight	Slight	White oak Northern red oak Black oak Green ash Bitternut hickory Yellow-poplar	85 85 --- --- --- 95	Eastern white pine, red pine, yellow-poplar, sugar maple, white oak, black walnut.
Ava part	2o	Slight	Slight	Slight	Slight	White oak Northern red oak Yellow-poplar Black walnut	75 80 90 ---	Black walnut, eastern cottonwood, sweetgum, yellow-poplar, white oak, American sycamore.
Goss:								
[1]930G:								
Goss part	4f	Moderate	Severe	Severe	Slight	White oak Shortleaf pine Post oak Blackjack oak Black oak	60 --- --- --- ---	Sweetgum, yellow-poplar, green ash.

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Important trees	Site index	Trees to plant
Goss:								
Alford part	1r	Severe	Severe	Slight	Slight	White oak	90	Eastern white pine,
						Yellow-poplar	98	red pine,
						Sweetgum	76	black walnut,
								yellow-poplar,
								white ash,
								black locust.
Neotoma:								
[2]976G	1r	Severe	Severe	Slight	Slight	Northern red oak	85	Eastern white pine,
						Yellow-poplar	105	yellow-poplar.
[1]977E:								
Neotoma part	1r	Moderate	Moderate	Slight	Slight	Northern red oak	85	Eastern white pine,
						Yellow-poplar	105	yellow-poplar.
Wellston part	2r	Moderate	Moderate	Slight	Slight	Northern red oak	81	Eastern white pine,
						Yellow-poplar	97	black walnut,
						Virginia pine	76	yellow-poplar.
[1]977G:								
Neotoma part	1r	Severe	Severe	Slight	Slight	Northern red oak	85	Eastern white pine,
						Yellow-poplar	105	yellow-poplar.
Wellston part	2r	Severe	Severe	Slight	Slight	Northern red oak	81	Eastern white pine,
						Yellow-poplar	97	black walnut,
						Virginia pine	76	yellow-poplar.
Alford:								
[1]999D:								
Alford part	1o	Slight	Slight	Slight	Slight	White oak	90	Eastern white pine,
						Yellow-poplar	98	red pine,
						Sweetgum	76	black walnut,
								yellow-poplar,
								white ash,
								black locust.
Hickory part	1r	Moderate	Moderate	Slight	Slight	White oak	85	Eastern white pine,
						Northern red oak	85	red pine,
						Black oak	---	yellow-poplar,
						Green ash	---	sugar maple,
						Bitternut hickory	---	white oak,
						Yellow-poplar	95	black walnut.
[1]999D3:								
Alford part	1o	Slight	Slight	Slight	Slight	White oak	90	Eastern white pine,
						Yellow-poplar	98	red pine,
						Sweetgum	76	black walnut,
								yellow-poplar,
								white ash,
								black locust.
Hickory part	1r	Moderate	Moderate	Slight	Slight	White oak	85	Eastern white pine,
						Northern red oak	85	red pine,
						Black oak	---	yellow-poplar,
						Green ash	---	sugar maple,
						Bitternut hickory	---	white oak,
						Yellow-poplar	95	black walnut.
Hickory:								
[1]999E:								
Hickory part	1r	Moderate	Moderate	Slight	Slight	White oak	85	Eastern white pine,
						Northern red oak	85	red pine,
						Black oak	---	yellow-poplar,
						Green ash	---	sugar maple,
						Bitternut hickory	---	white oak,
						Yellow-poplar	95	black walnut.

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Important trees	Site index	Trees to plant
Hickory:								
Alford part------	1r	Moderate	Moderate	Slight	Slight	White oak------------	90	Eastern white pine,
						Yellow-poplar--------	98	red pine,
						Sweetgum-------------	76	black walnut,
								yellow-poplar,
								white ash,
								black locust.
[1]999E3:								
Hickory part------	1r	Moderate	Moderate	Slight	Slight	White oak------------	85	Eastern white pine,
						Northern red oak-----	85	red pine,
						Black oak------------	---	yellow-poplar,
						Green ash------------	---	sugar maple,
						Bitternut hickory----	---	white oak,
						Yellow-poplar--------	95	black walnut.
Alford part-------	1r	Moderate	Moderate	Slight	Slight	White oak------------	90	Eastern white pine,
						Yellow-poplar--------	98	red pine,
						Sweetgum-------------	76	black walnut,
								yellow-poplar,
								white ash,
								black locust.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior characteristics of the mapping unit.
[2]Rock outcrop part not assigned an ordination symbol.

TABLE 7.--RECREATIONAL DEVELOPMENT

["Percs slowly" and other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Hoyleton:				
3A, 3B2	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, percs slowly.	Moderate: wetness.
Hickory:				
8E, 8E3	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
8G	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wynoose:				
12	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness, percs slowly.	Severe: wetness.
Bluford:				
13A, 13B	Moderate: percs slowly, wetness.	Moderate: wetness.	Moderate: percs slowly.	Moderate: wetness.
Ava:				
14B	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly.	Slight.
14C3	Moderate: percs slowly, slope.	Moderate: slope.	Severe: slope.	Slight.
Darwin:				
71, 71+, F71, W71	Severe: wetness, floods, percs slowly.	Severe: wetness, too clayey.	Severe: wetness, too clayey.	Severe: wetness.
Okaw:				
84	Severe: wetness, percs slowly, floods.	Severe: wetness.	Severe: wetness, percs slowly.	Severe: wetness.
Jacob:				
85, W85	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness.
Bonnie:				
108	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.
Racoon:				
109	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Colp:				
122A	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
122B2	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly.	Slight.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Colp:				
122C2	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Slight.
122C3	Moderate: slope, percs slowly.	Moderate: too clayey, slope.	Severe: slope.	Moderate: too clayey.
122D	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Alvin:				
131B	Slight	Slight	Moderate: slope.	Slight.
131C3	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
131E	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Starks:				
132	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.	Slight.
Camden:				
134A, 134B2	Moderate: slope.	Slight	Moderate: slope.	Slight.
134C2, 134C3	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
134D	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Gorham:				
162	Severe: floods, wetness.	Severe: wetness, floods.	Severe: wetness, too clayey.	Severe: wetness.
Stoy:				
164A, 164B, 164C2	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, slope.	Moderate: wetness.
Weir:				
165	Severe: wetness, floods, percs slowly.	Severe: wetness.	Severe: wetness, floods, percs slowly.	Severe: wetness.
Dupo:				
180	Severe: floods, wetness.	Moderate: wetness, floods.	Moderate: floods, wetness.	Moderate: wetness.
Sexton:				
208	Severe: wetness.	Severe: wetness.	Severe: wetness, percs slowly.	Severe: wetness.
Hosmer:				
214B	Moderate: percs slowly.	Moderate: wetness.	Moderate: percs slowly, slope.	Slight.
214C2, 214C3	Moderate: percs slowly, slope.	Moderate: wetness, slope.	Severe: slope.	Slight.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Hosmer:				
214D2, 214D3	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
St. Charles:				
243B	Slight	Slight	Moderate: slope.	Slight.
Alford:				
308B2	Slight	Slight	Moderate: slope.	Slight.
308C2, 308C3	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
308D2, 308D3, 308E3, 308E	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
308G	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Haymond:				
331	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.
Wakeland:				
333	Severe: floods.	Severe: floods.	Severe: floods	Moderate: floods, wetness.
Birds:				
334	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
Hurst:				
338A, 338B2	Severe: percs slowly.	Moderate: wetness.	Severe: percs slowly.	Moderate: wetness.
Belknap:				
382	Severe: floods, wetness.	Moderate: wetness.	Severe: wetness, floods.	Moderate: wetness, floods.
Piopolis:				
420, W420	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.
Karnak:				
426	Severe: wetness, too clayey, percs slowly.	Severe: wetness, floods, too clayey.	Severe: wetness, floods, too clayey.	Severe: wetness, floods, too clayey.
Burnside:				
427	Severe: floods.	Moderate: floods.	Moderate: floods.	Slight.
Coffeen:				
428	Severe: floods.	Moderate: floods, wetness.	Severe: floods, wetness.	Moderate: wetness.
Raddle:				
430A	Severe: floods.	Moderate: floods.	Moderate: floods.	Slight.
Ware:				
456	Moderate: floods.	Slight	Moderate: floods.	Slight.
F456	Severe: floods.	Moderate: floods.	Moderate: floods.	Slight.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Booker:				
457	Severe: wetness, percs slowly, too clayey.	Severe: wetness, too clayey.	Severe: wetness, too clayey, percs slowly.	Severe: wetness, too clayey.
W457	Severe: floods, wetness, percs slowly.	Severe: wetness, floods, too clayey.	Severe: wetness, floods, percs slowly.	Severe: wetness, too clayey.
Urban land: 533.				
Bowdre:				
589	Severe: wetness, too clayey, percs slowly.	Severe: wetness, too clayey.	Severe: wetness, too clayey, percs slowly.	Severe: wetness, too clayey.
Cairo:				
590	Severe: floods, wetness, percs slowly.	Severe: wetness, floods, too clayey.	Severe: wetness, floods, percs slowly.	Severe: wetness, too clayey.
Medway:				
682, F682	Severe: floods.	Moderate: floods.	Moderate: floods.	Slight.
Banlic:				
787	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, percs slowly.	Moderate: wetness.
Orthents, silty:				
801	Moderate: percs slowly.	Moderate: slope.	Severe: slope.	Slight.
Orthents, loamy:				
802C	Moderate: large stones.	Moderate: slope.	Severe: slope.	Moderate: large stones.
802G	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Orthents, clayey:				
805	Severe: floods, too clayey.	Severe: floods, too clayey.	Severe: floods, percs slowly, too clayey.	Severe: too clayey.
Hosmer:				
[1]850D:				
Hosmer part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Hickory part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
[1]850D3:				
Hosmer part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Hickory part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Hickory:				
[1]850E:				
Hickory part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.

See footnotes at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Hickory:				
Hosmer part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
[1]850E3:				
Hickory part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Hosmer part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Alford:				
[1]852E:				
Alford part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Wellston part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
[1]852G:				
Alford part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wellston part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ava:				
[1]929C3:				
Ava part	Moderate: percs slowly, slope.	Moderate: slope.	Severe: slope.	Slight.
Hickory part	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Hickory:				
[1]929D2:				
Hickory part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Ava part	Moderate: percs slowly.	Moderate: slope.	Severe: slope.	Slight.
Goss:				
[1]930G:				
Goss part	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.
Alford part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Neotoma:				
[2]976G	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
[1]977E:				
Neotoma part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
Wellston part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
[1]977G:				
Neotoma part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.

See footnotes at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Neotoma:				
Wellston part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Alford:				
[1]999D:				
Alford part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Hickory part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
[1]999D3:				
Alford part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Hickory part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Hickory:				
[1]999E:				
Hickory part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Alford part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
[1]999E3:				
Hickory part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Alford part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Mine dump:				
M.D.				
Quarry:				
Qu.				

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior characteristics of the mapping unit.
[2]Rock outcrop part not rated.

TABLE 8.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Hoyleton:										
3A	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
3B2	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Hickory:										
8E, 8E3	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
8G	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Wynoose:										
12	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Bluford:										
13A	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
13B	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ava:										
14B	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
14C3	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Darwin:										
71, 71+	Fair	Fair	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair.
F71, W71	Poor	Poor	Fair	Poor	Poor	Good	Good	Poor	Poor	Good.
Okaw:										
84	Fair	Fair	Fair	Fair	Poor	Fair	Poor	Fair	Fair	Poor.
Jacob:										
85, W85	Poor	Fair	Fair	Fair	Poor	Poor	Good	Fair	Fair	Fair.
Bonnie:										
108	Poor	Fair	Fair	Fair	Poor	Fair	Good	Fair	Fair	Fair.
Racoon:										
109	Fair	Fair	Fair	Fair	Fair	Poor	Poor	Fair	Fair	Poor.
Colp:										
122A	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
122B2	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
122C2, 122C3, 122D	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Alvin:										
131B	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
131C3	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
131E	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Starks:										
132	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.

TABLE 8.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Camden:										
134A	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
134B2	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
134C2, 134C3	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
134D	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Gorham:										
162	Poor	Fair	Good	Fair	Fair	Good	Fair	Fair	Fair	Good.
Stoy:										
164A	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
164B, 164C2	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Weir:										
165	Fair	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Fair	Poor.
Dupo:										
180	Fair	Good	Good	Good	Good	Fair	Good	Good	Good	Fair.
Sexton:										
208	Fair	Fair	Fair	Fair	Fair	Poor	Poor	Fair	Fair	Poor.
Hosmer:										
214B	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
214C2, 214C3	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
214D2, 214D3	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
St. Charles:										
243B	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Alford:										
308B2	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
308C2, 308C3	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
308D2, 308D3, 308E, 308E3	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
308G	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Haymond:										
331	Poor	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
Wakeland:										
333	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
Birds:										
334	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Hurst:										
338A	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Good	Fair.
338B2	Fair	Good	Good	Good	Fair	Fair	Poor	Good	Good	Poor.

TABLE 8.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Belknap:										
382----------------	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Piopolis:										
420, W420----------	Poor	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
Karnak:										
426----------------	Very poor.	Poor	Poor	Fair	Very poor.	Poor	Good	Poor	Fair	Fair.
Burnside:										
427----------------	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Coffeen:										
428----------------	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Raddle:										
430A---------------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ware:										
456----------------	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
F456---------------	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Fair.
Booker:										
457, W457----------	Poor	Poor	Fair	Poor	Poor	Poor	Good	Poor	Poor	Fair.
Urban land:										
533.										
Bowdre:										
589----------------	Fair	Good	Good	Good	Good	Fair	Fair	Fair	Good	Fair.
Cairo:										
590----------------	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair.
Medway:										
682, F682----------	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Banlic:										
787----------------	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Orthents, silty:										
801----------------	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor.
Orthents, loamy:										
802C---------------	Poor	Fair	Fair	Fair	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
802G---------------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Orthents, clayey:										
805----------------	Fair	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor	Poor.
Hosmer:										
[1]850D:										
Hosmer part------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Hickory part-----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
[1]850D3:										
Hosmer part------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnotes at end of table.

TABLE 8.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Hosmer:										
Hickory part	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Hickory:										
[1]850E:										
Hickory part	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Hosmer part	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
[1]850E3:										
Hickory part	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Hosmer part	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Alford:										
[1]852E:										
Alford part	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Wellston part	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
[1]852G:										
Alford part	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Wellston part	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Ava:										
[1]929C3:										
Ava part	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Hickory part	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Hickory:										
[1]929D2:										
Hickory part	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Ava part	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Goss:										
[1]930G:										
Goss part	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Alford part	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Neotoma:										
[2]976G	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
[1]977E:										
Neotoma part	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Wellston part	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnotes at end of table.

TABLE 8.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Neotoma:										
[1]977G:										
Neotoma part	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Wellston part	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Alford:										
[1]999D:										
Alford part	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Hickory part	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
[1]999D3:										
Alford part	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Hickory part	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Hickory:										
[1]999E:										
Hickory part	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Alford part	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
[1]999E3:										
Hickory part	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Alford part	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Mine dump:										
M.D.										
Quarry:										
Qu.										

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior characteristics of the mapping unit.

[2]Rock outcrop part not rated.

TABLE 9.--BUILDING SITE DEVELOPMENT

["Shrink-swell" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Hoyleton:					
3A, 3B2	Severe: wetness.	Severe: shrink-swell.	Severe: wetness.	Severe: shrink-swell.	Severe: frost action, shrink-swell, low strength.
Hickory:					
8E, 8E3, 8G	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Wynoose:					
12	Severe: wetness, too clayey.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell, frost action.
Bluford:					
13A, 13B	Severe: wetness.	Moderate: shrink-swell, wetness.	Severe: wetness.	Moderate: shrink-swell, wetness.	Severe: frost action, shrink-swell.
Ava:					
14B	Moderate: wetness.	Moderate: shrink-swell.	Moderate: shrink-swell, wetness.	Moderate: shrink-swell, slope.	Severe: frost action, low strength.
14C3	Moderate: wetness, slope.	Moderate: slope.	Moderate: shrink-swell, wetness, slope.	Severe: slope.	Severe: frost action, low strength.
Darwin:					
71, 71+, F71, W71	Severe: wetness, too clayey, floods.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell, wetness.	Severe: wetness, shrink-swell, floods.
Okaw:					
84	Severe: wetness, floods, too clayey.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, low strength.
Jacob:					
85, W85	Severe: wetness, floods.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: wetness, floods, shrink-swell.
Bonnie:					
108	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, frost action.
Racoon:					
109	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, shrink-swell, frost action.
Colp:					
122A, 122B2	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, frost action, low strength.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Colp:					
122C2, 122C3	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, frost action, low strength.
122D	Severe: too clayey, slope.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, frost action, low strength.
Alvin:					
131B	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action.
131C3	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: frost action, slope.
131E	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Starks:					
132	Severe: wetness.	Moderate: shrink-swell.	Severe: wetness.	Moderate: shrink-swell.	Severe: frost action, low strength.
Camden:					
134A	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell.	Severe: frost action, low strength.
134B2	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, slope.	Severe: frost action, low strength.
134C2, 134C3	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Severe: frost action, low strength.
134D	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.
Gorham:					
162	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, frost action, low strength.
Stoy:					
164A, 164B, 164C2	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Moderate: wetness, shrink-swell.	Severe: frost action, low strength.
Weir:					
165	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, frost action, shrink-swell.
Dupo:					
180	Severe: wetness, floods.	Severe: floods, shrink-swell.	Severe: floods, wetness, shrink-swell.	Severe: floods, shrink-swell.	Severe: floods, frost action, shrink-swell.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Sexton:					
208	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, shrink-swell, frost action.
Hosmer:					
214B	Moderate: wetness.	Slight	Moderate: wetness.	Moderate: slope.	Severe: frost action.
214C2, 214C3	Moderate: wetness, slope.	Moderate: slope.	Moderate: wetness, slope.	Severe: slope.	Severe: frost action.
214D2, 214D3	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.
St. Charles:					
243B	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: frost action.
Alford:					
308B2	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: frost action, low strength.
308C2, 308C3	Moderate: slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: frost action, low strength.
308D2, 308D3, 308E, 308E3, 308G	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.
Haymond:					
331	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods, frost action.
Wakeland:					
333	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, frost action.
Birds:					
334	Severe: wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, frost action.
Hurst:					
338A, 338B2	Severe: wetness, too clayey.	Severe: shrink-swell, floods, low strength.	Severe: wetness, shrink-swell, floods.	Severe: shrink-swell, floods, low strength.	Severe: shrink-swell, frost action, low strength.
Belknap:					
382	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods, frost action.
Piopolis:					
420, W420	Severe: wetness, floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: wetness, frost action.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Karnak:					
426	Severe: floods, too clayey, wetness.	Severe: low strength, wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.
Burnside:					
427	Severe: floods, large stones.	Severe: floods.	Severe: floods, depth to rock.	Severe: floods.	Severe: floods.
Coffeen:					
428	Severe: floods, wetness.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Severe: floods, frost action.
Raddle:					
430A	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: frost action.
Ware:					
456	Severe: cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.
F456	Severe: floods, cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Booker:					
457	Severe: wetness, too clayey.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, shrink-swell, low strength.
W457	Severe: wetness, floods, too clayey.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.
Urban land: 533.					
Bowdre:					
589	Severe: wetness, too clayey.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.
Cairo:					
590	Severe: wetness, floods, too clayey.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.
Medway:					
682, F682	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, frost action.
Banlic:					
787	Severe: wetness.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Severe: frost action.
Orthents, silty:					
801	Moderate: wetness.	Moderate: wetness.	Severe: wetness.	Severe: slope.	Severe: frost action.
Orthents, loamy:					
802C	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Severe: slope.	Moderate: shrink-swell, frost action.
802G	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Orthents, clayey:					
805	Severe: floods, too clayey.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.
Hosmer:					
[1]850D:					
Hosmer part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.
Hickory part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
[1]850D3:					
Hosmer part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.
Hickory part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Hickory:					
[1]850E:					
Hickory part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Hosmer part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.
[1]850E3:					
Hickory part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Hosmer part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.
Alford:					
[1]852E:					
Alford part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.
Wellston part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
[1]852G:					
Alford part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.
Wellston part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
Ava:					
[1]929C3:					
Ava part	Moderate: wetness, slope.	Moderate: slope.	Moderate: shrink-swell, wetness, slope.	Severe: slope.	Severe: frost action, low strength.

See footnotes at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Ava:					
Hickory part	Moderate: too clayey, slope.	Moderate: shrink-swell, low strength, slope.	Moderate: shrink-swell, low strength, slope.	Severe: slope.	Severe: low strength.
Hickory:					
[1]929D2:					
Hickory part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Ava part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength.
Goss:					
[1]930G:					
Goss part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Alford part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.
Neotoma:					
[2]976G	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
[1]977E:					
Neotoma part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wellston part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
[1]977G:					
Neotoma part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wellston part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
Alford:					
[1]999D:					
Alford part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.
Hickory part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
[1]999D3:					
Alford part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.
Hickory part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Hickory:					
[1]999E:					
Hickory part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.

See footnotes at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Hickory:					
Alford part----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.
[1]999E3:					
Hickory part---	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Alford part----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.
Mine dump: M.D.					
Quarry: Qu.					

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior characteristics of the mapping unit.

[2]Rock outcrop part not rated.

TABLE 10.--SANITARY FACILITIES

["Percs slowly" and other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Hoyleton:					
3A	Severe: percs slowly, wetness.	Slight	Severe: wetness.	Severe: wetness.	Fair: too clayey.
3B2	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Fair: too clayey.
Hickory:					
8E, 8E3	Severe: slope.	Severe: slope.	Moderate: too clayey.	Severe: slope.	Poor: slope.
8G	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Wynoose:					
12	Severe: percs slowly, wetness.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
Bluford:					
13A	Severe: percs slowly, wetness.	Slight	Moderate: wetness.	Moderate: wetness.	Fair: too clayey.
13B	Severe: percs slowly, wetness.	Moderate: slope.	Moderate: wetness.	Moderate: wetness.	Fair: too clayey.
Ava:					
14B	Severe: percs slowly.	Moderate: slope.	Severe: wetness.	Slight	Fair: thin layer.
14C3	Severe: percs slowly.	Severe: slope.	Severe: wetness.	Moderate: slope.	Fair: thin layer, slope.
Darwin:					
71, 71+, F71, W71	Severe: percs slowly, wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, too clayey.	Severe: wetness, floods.	Poor: too clayey, wetness.
Okaw:					
84	Severe: percs slowly, floods, wetness.	Moderate: slope.	Severe: wetness, floods, too clayey.	Severe: wetness, floods.	Poor: too clayey, wetness, area reclaim.
Jacob:					
85, W85	Severe: floods, wetness, percs slowly.	Severe: floods.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness, too clayey.
Bonnie:					
108	Severe: floods, percs slowly, wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
Racoon:					
109	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Colp:					
122A	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey.
122B2	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
122C2, 122C3	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
122D	Severe: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Severe: slope.	Poor: too clayey, slope.
Alvin:					
131B	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
131C3	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope.
131E	Severe: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage, slope.	Poor: slope.
Starks:					
132	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Good.
Camden:					
134A, 134B2	Slight	Severe: seepage.	Severe: seepage.	Slight	Good.
134C2, 134C3	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: slope.
134D	Severe: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: slope.	Poor: slope.
Gorham:					
162	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
Stoy:					
164A	Severe: percs slowly, wetness.	Slight	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
164B, 164C2	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
Weir:					
165	Severe: wetness, percs slowly.	Slight	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
Dupo:					
180	Severe: percs slowly, wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, too clayey.	Severe: wetness, floods.	Fair: thin layer.
Sexton:					
208	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Hosmer:					
214B	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
214C2, 214C3	Severe: percs slowly.	Severe: slope.	Slight	Moderate: slope.	Fair: slope.
214D2, 214D3	Severe: percs slowly, slope.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
St. Charles:					
243B	Slight	Moderate: seepage, slope.	Slight	Slight	Fair: too clayey.
Alford:					
308B2	Slight	Moderate: seepage, slope.	Slight	Slight	Good.
308C2, 308C3	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.	Fair: slope.
308D2, 308D3, 308E, 308E3	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
308G	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Haymond:					
331	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
Wakeland:					
333	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Good.
Birds:					
334	Severe: wetness, floods.	Severe: wetness, floods.	Severe: floods.	Severe: floods, wetness.	Poor: wetness.
Hurst:					
338A	Severe: percs slowly, wetness.	Slight	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
338B2	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
Belknap:					
382	Severe: floods.	Severe: wetness, floods.	Severe: floods.	Severe: wetness, floods.	Good.
Piopolis:					
420, W420	Severe: percs slowly, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
Karnak:					
426	Severe: percs slowly, floods, wetness.	Severe: floods, wetness.	Severe: too clayey, wetness, floods.	Severe: floods, wetness.	Poor: wetness, too clayey.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Burnside:					
427	Severe: floods, depth to rock.	Severe: floods, depth to rock.	Severe: floods, depth to rock.	Severe: floods.	Poor: large stones.
Coffeen:					
428	Severe: floods, wetness.	Severe: floods, wetness, seepage.	Severe: floods.	Severe: floods, wetness.	Good.
Raddle:					
430A	Moderate: floods.	Moderate: seepage.	Moderate: floods.	Moderate: floods.	Good.
Ware:					
456	Moderate: wetness.	Severe: seepage.	Severe: seepage.	Moderate: floods.	Fair: thin layer, too sandy.
F456	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: floods.	Fair: thin layer, too sandy.
Booker:					
457	Severe: percs slowly, wetness.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey.
W457	Severe: percs slowly, floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness, too clayey.	Severe: floods, wetness.	Poor: wetness, too clayey.
Urban land: 533.					
Bowdre:					
589	Severe: wetness, percs slowly.	Severe: wetness, seepage.	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
Cairo:					
590	Severe: percs slowly, wetness, floods.	Severe: seepage, wetness, floods.	Severe: wetness, floods, seepage.	Severe: wetness, floods.	Poor: too clayey, wetness.
Medway:					
682, F682	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, seepage.	Severe: floods.	Good.
Banlic:					
787	Severe: percs slowly, wetness.	Slight	Severe: wetness.	Moderate: wetness, floods.	Good.
Orthents, silty:					
801	Severe: percs slowly, wetness.	Severe: slope.	Moderate: wetness.	Moderate: wetness.	Fair: too clayey.
Orthents, loamy:					
802C	Moderate: large stones.	Severe: slope.	Moderate: large stones.	Moderate: slope.	Fair: large stones.
802G	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Orthents, clayey:					
805	Severe: floods, wetness, percs slowly.	Severe: slope.	Severe: floods, too clayey.	Severe: floods.	Poor: too clayey.
Hosmer:					
[1]850D:					
Hosmer part	Severe: percs slowly, slope.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
Hickory part	Severe: slope.	Severe: slope.	Moderate: too clayey.	Severe: slope.	Poor: slope.
[1]850D3:					
Hosmer part	Severe: percs slowly, slope.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
Hickory part	Severe: slope.	Severe: slope.	Moderate: too clayey.	Severe: slope.	Poor: slope.
Hickory:					
[1]850E:					
Hickory part	Severe: slope.	Severe: slope.	Moderate: too clayey.	Severe: slope.	Poor: slope.
Hosmer part	Severe: percs slowly, slope.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
[1]850E3:					
Hickory part	Severe: slope.	Severe: slope.	Moderate: too clayey.	Severe: slope.	Poor: slope.
Hosmer part	Severe: percs slowly, slope.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
Alford:					
[1]852E:					
Alford part	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
Wellston part	Severe: slope.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: slope.
[1]852G:					
Alford part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Wellston part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Ava:					
[1]929C3:					
Ava part	Severe: percs slowly.	Severe: slope.	Severe: wetness.	Moderate: slope.	Fair: thin layer, slope.
Hickory part	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
Hickory:					
[1]929D2:					
Hickory part	Severe: slope.	Severe: slope.	Moderate: too clayey.	Severe: slope.	Poor: slope.

See footnotes at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Hickory:					
Ava part	Severe: percs slowly.	Severe: slope.	Severe: wetness.	Moderate: slope.	Fair: too clayey.
Goss:					
[1]930G:					
Goss part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope, area reclaim.
Alford part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Neotoma:					
[2]976G	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, slope, seepage.	Severe: slope, seepage.	Poor: slope, small stones.
[1]977E:					
Neotoma part	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, small stones.
Wellston part	Severe: slope.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: slope.
[1]977G:					
Neotoma part	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, slope, seepage.	Severe: slope, seepage.	Poor: slope, small stones.
Wellston part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Alford:					
[1]999D:					
Alford part	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
Hickory part	Severe: slope.	Severe: slope.	Moderate: too clayey.	Severe: slope.	Poor: slope.
[1]999D3:					
Alford part	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
Hickory part	Severe: slope.	Severe: slope.	Moderate: too clayey.	Severe: slope.	Poor: slope.
Hickory:					
[1]999E:					
Hickory part	Severe: slope.	Severe: slope.	Moderate: too clayey.	Severe: slope.	Poor: slope.
Alford part	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.

See footnotes at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
[1]999E3:					
Hickory part-----	Severe: slope.	Severe: slope.	Moderate: too clayey.	Severe: slope.	Poor: slope.
Alford part------	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
Mine dump: M.D.					
Quarry: Qu.					

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior characteristics of the mapping unit.
[2]Rock outcrop part not rated.

TABLE 11.--CONSTRUCTION MATERIALS

["Shrink-swell" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry indicates that the soil was not rated.]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Hoyleton:				
3A, 3B2	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Fair: thin layer.
Hickory:				
8E, 8E3	Poor: low strength.	Unsuited	Unsuited	Poor: slope.
8G	Poor: low strength, slope.	Unsuited	Unsuited	Poor: slope.
Wynoose:				
12	Poor: shrink-swell, frost action.	Unsuited	Unsuited	Poor: wetness.
Bluford:				
13A, 13B	Poor: frost action, shrink-swell.	Unsuited	Unsuited	Fair: area reclaim, thin layer.
Ava:				
14B	Poor: frost action, low strength.	Unsuited	Unsuited	Good.
14C3	Poor: frost action, low strength.	Unsuited	Unsuited	Fair: slope.
Darwin:				
71, 71+, F71, W71	Poor: shrink-swell, wetness, low strength.	Unsuited	Unsuited	Poor: too clayey, wetness.
Okaw:				
84	Poor: low strength, shrink-swell, frost action.	Unsuited	Unsuited	Poor: wetness, area reclaim.
Jacob:				
85, W85	Poor: shrink-swell, wetness, low strength.	Unsuited	Unsuited	Poor: too clayey, wetness.
Bonnie:				
108	Poor: frost action, wetness.	Unsuited	Unsuited	Poor: wetness.
Racoon:				
109	Poor: wetness, shrink-swell, low strength.	Unsuited	Unsuited	Poor: wetness.
Colp:				
122A, 122B2	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Fair: thin layer.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Colp:				
122C2	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Fair: thin layer, slope.
122C3	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Fair: too clayey, slope.
122D	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: slope.
Alvin:				
131B	Fair: frost action.	Fair: excess fines.	Unsuited	Good.
131C3	Fair: frost action.	Fair: excess fines.	Unsuited	Fair: slope.
131E	Fair: frost action, slope.	Fair: excess fines.	Unsuited	Poor: slope.
Starks:				
132	Poor: frost action, low strength.	Poor: excess fines.	Unsuited	Fair: thin layer.
Camden:				
134A, 134B2	Poor: frost action, low strength.	Unsuited: excess fines.	Unsuited	Fair: thin layer.
134C2, 134C3	Poor: frost action, low strength.	Unsuited: excess fines.	Unsuited	Fair: thin layer, slope.
134D	Poor: frost action, low strength.	Unsuited: excess fines.	Unsuited	Poor: slope.
Gorham:				
162	Poor: frost action, wetness.	Poor: excess fines.	Unsuited	Poor: wetness.
Stoy:				
164A, 164B, 164C2	Poor: frost action, low strength.	Unsuited	Unsuited	Fair: thin layer.
Weir:				
165	Poor: wetness, frost action.	Unsuited	Unsuited	Poor: wetness.
Dupo:				
180	Poor: frost action.	Unsuited	Unsuited	Fair: thin layer.
Sexton:				
208	Poor: wetness, frost action, low strength.	Unsuited	Unsuited	Poor: wetness.
Hosmer:				
214B	Poor: frost action.	Unsuited	Unsuited	Good.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Hosmer:				
214C2, 214C3	Poor: frost action.	Unsuited	Unsuited	Fair: slope.
214D2, 214D3	Poor: frost action.	Unsuited	Unsuited	Poor: slope.
St. Charles:				
243B	Poor: frost action.	Unsuited	Unsuited	Fair: thin layer.
Alford:				
308B2	Poor: frost action.	Unsuited	Unsuited	Fair: thin layer.
308C2, 308C3	Poor: frost action.	Unsuited	Unsuited	Fair: thin layer, slope.
308D2, 308D3, 308E, 308E3	Poor: frost action.	Unsuited	Unsuited	Poor: slope.
308G	Poor: frost action, slope.	Unsuited	Unsuited	Poor: slope.
Haymond:				
331	Poor: frost action.	Unsuited	Unsuited	Good.
Wakeland:				
333	Poor: frost action.	Unsuited	Unsuited	Good.
Birds:				
334	Poor: wetness, frost action.	Unsuited	Unsuited	Poor: wetness.
Hurst:				
338A, 338B2	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Fair: thin layer.
Belknap:				
382	Poor: frost action.	Unsuited	Unsuited	Good.
Piopolis:				
420, W420	Poor: wetness, frost action.	Unsuited	Unsuited	Poor: wetness.
Karnak:				
426	Poor: area reclaim, shrink-swell, low strength.	Unsuited	Unsuited	Poor: too clayey, wetness.
Burnside:				
427	Fair: frost action, large stones.	Unsuited	Unsuited	Good.
Coffeen:				
428	Poor: frost action.	Unsuited	Unsuited	Good.
Raddle:				
430A	Poor: frost action.	Unsuited	Unsuited	Good.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Ware:				
456, F456	Fair: frost action.	Fair: excess fines.	Unsuited	Good.
Booker:				
457, W457	Poor: wetness, shrink-swell, low strength.	Unsuited	Unsuited	Poor: wetness, too clayey.
Urban land: 533.				
Bowdre:				
589	Poor: shrink-swell.	Unsuited	Unsuited	Poor: too clayey.
Cairo:				
590	Poor: wetness, shrink-swell, low strength.	Poor: excess fines.	Unsuited	Poor: too clayey, wetness, area reclaim.
Medway:				
682, F682	Poor: frost action.	Unsuited	Unsuited	Good.
Banlic:				
787	Poor: frost action.	Unsuited	Unsuited	Good.
Orthents, silty:				
801	Poor: frost action.	Unsuited	Unsuited	Poor: thin layer.
Orthents, loamy:				
802C	Fair: frost action, shrink-swell.	Unsuited	Unsuited	Poor: large stones.
802G	Poor: slope.	Unsuited	Unsuited	Poor: large stones.
Orthents, clayey:				
805	Poor: shrink-swell.	Unsuited	Unsuited	Poor: too clayey.
Hosmer:				
[1]850D:				
Hosmer part	Poor: frost action.	Unsuited	Unsuited	Poor: slope.
Hickory part	Poor: low strength.	Unsuited	Unsuited	Poor: slope.
[1]850D3:				
Hosmer part	Poor: frost action.	Unsuited	Unsuited	Poor: slope.
Hickory part	Poor: low strength.	Unsuited	Unsuited	Poor: slope.
Hickory:				
[1]850E:				
Hickory part	Poor: low strength.	Unsuited	Unsuited	Poor: slope.
Hosmer part	Poor: frost action.	Unsuited	Unsuited	Poor: slope.

See footnotes at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Hickory:				
[1]850E3:				
Hickory part	Poor: low strength.	Unsuited	Unsuited	Poor: slope.
Hosmer part	Poor: frost action.	Unsuited	Unsuited	Poor: slope.
Alford:				
[1]852E:				
Alford part	Poor: frost action.	Unsuited	Unsuited	Poor: slope.
Wellston part	Poor: frost action.	Unsuited	Unsuited	Poor: slope.
[1]852G:				
Alford part	Poor: frost action, slope.	Unsuited	Unsuited	Poor: slope.
Wellston part	Poor: slope, frost action.	Unsuited	Unsuited	Poor: slope.
Ava:				
[1]929C3:				
Ava part	Poor: frost action, low strength.	Unsuited	Unsuited	Fair: slope.
Hickory part	Poor: low strength.	Unsuited	Unsuited	Fair: thin layer, slope.
Hickory:				
[1]929D2:				
Hickory part	Poor: low strength.	Unsuited	Unsuited	Poor: slope.
Ava part	Poor: frost action, low strength.	Unsuited	Unsuited	Poor: slope.
Goss:				
[1]930G:				
Goss part	Poor: slope.	Unsuited	Unsuited: excess fines.	Poor: small stones, thin layer, slope.
Alford part	Poor: frost action, slope.	Unsuited	Unsuited	Poor: slope.
Neotoma:				
[2]976G	Poor: slope.	Unsuited	Unsuited	Poor: slope, small stones.
[1]977E:				
Neotoma part	Fair: slope, thin layer.	Unsuited	Unsuited	Poor: slope, small stones.
Wellston part	Poor: frost action.	Unsuited	Unsuited	Poor: slope.

See footnotes at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Neotoma:				
[1]977G:				
Neotoma part	Poor: slope.	Unsuited	Unsuited	Poor: slope, small stones.
Wellston part	Poor: slope, frost action.	Unsuited	Unsuited	Poor: slope.
Alford:				
[1]999D:				
Alford part	Poor: frost action.	Unsuited	Unsuited	Poor: slope.
Hickory part	Poor: low strength.	Unsuited	Unsuited	Poor: slope.
[1]999D3:				
Alford part	Poor: frost action.	Unsuited	Unsuited	Poor: slope.
Hickory part	Poor: low strength.	Unsuited	Unsuited	Poor: slope.
Hickory:				
[1]999E:				
Hickory part	Poor: low strength.	Unsuited	Unsuited	Poor: slope.
Alford part	Poor: frost action.	Unsuited	Unsuited	Poor: slope.
[1]999E3:				
Hickory part	Poor: low strength.	Unsuited	Unsuited	Poor: slope.
Alford part	Poor: frost action.	Unsuited	Unsuited	Poor: slope.
Mine dump: M.D.				
Quarry: Qu.				

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior characteristics of the mapping unit.
[2]Rock outcrop part not rated.

TABLE 12.--WATER MANAGEMENT

["Seepage" and some of the other terms that describe restrictive soil features are defined in the Glossary. Absence of an entry means soil was not evaluated]

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Hoyleton: 3A, 3B2	Favorable	Low strength	Deep to water	Percs slowly, wetness.	Percs slowly, erodes easily.	Wetness.
Hickory: 8E, 8E3, 8G	Slope	Low strength, shrink-swell.	No water	Not needed	Slope, erodes easily.	Slope, erodes easily.
Wynoose: 12	Favorable	Low strength	Favorable	Percs slowly, wetness.	Not needed	Not needed.
Bluford: 13A, 13B	Favorable	Low strength	Deep to water	Percs slowly	Percs slowly	Favorable.
Ava: 14B, 14C3	Favorable	Low strength	Deep to water	Not needed	Erodes easily, percs slowly.	Erodes easily, slope.
Darwin: 71, 71+, F71, W71	Favorable	Hard to pack, shrink-swell.	Slow refill	Percs slowly, floods.	Not needed	Not needed.
Okaw: 84	Favorable	Low strength, shrink-swell.	Slow refill	Floods, percs slowly, poor outlets.	Percs slowly, wetness.	Percs slowly, wetness.
Jacob: 85, W85	Floods	Low strength, shrink-swell.	Slow refill	Percs slowly	Not needed	Not needed.
Bonnie: 108	Favorable	Low strength, piping.	Favorable	Floods, wetness, poor outlets.	Not needed	Not needed.
Racoon: 109	Favorable	Shrink-swell, low strength.	Favorable	Percs slowly	Not needed	Wetness.
Colp: 122A, 122B2, 122C2, 122C3, 122D	Favorable	Low strength, shrink-swell.	Deep to water	Percs slowly	Erodes easily, percs slowly.	Erodes easily.
Alvin: 131B, 131C3, 131E	Seepage	Seepage	No water	Not needed	Favorable	Favorable.
Starks: 132	Seepage	Shrink-swell	Deep to water	Favorable	Favorable	Favorable.
Camden: 134A, 134B2	Seepage	Low strength, piping.	Deep to water	Not needed	Favorable	Slope.
134C2, 134C3, 134D	Seepage	Low strength, piping.	Deep to water	Not needed	Slope, erodes easily.	Slope.
Gorham: 162	Favorable	Low strength	Favorable	Floods, wetness.	Not needed	Not needed.
Stoy: 164A, 164B, 164C2	Favorable	Low strength	Deep to water	Percs slowly	Percs slowly	Favorable.
Weir: 165	Favorable	Low strength	Slow refill	Percs slowly, floods.	Not needed	Not needed.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Dupo:						
180	Favorable	Shrink-swell	Favorable	Percs slowly, floods.	Not needed	Not needed.
Sexton:						
208	Favorable	Low strength	Favorable	Percs slowly	Not needed	Not needed.
Hosmer:						
214B, 214C2, 214C3, 214D2, 214D3	Favorable	Low strength, piping, erodes easily.	Deep to water	Not needed	Percs slowly, erodes easily, complex slope.	Percs slowly, erodes easily.
St. Charles:						
243B	Seepage	Shrink-swell	No water	Not needed	Favorable	Favorable.
Alford:						
308B2, 308C2, 308C3, 308D2, 308D3, 308E, 308E3, 308G	Seepage	Low strength, erodes easily.	No water	Not needed	Complex slope, erodes easily.	Erodes easily.
Haymond:						
331	Seepage	Piping, low strength.	Deep to water	Not needed	Not needed	Not needed.
Wakeland:						
333	Seepage	Piping, low strength.	Deep to water	Frost action, floods, wetness.	Not needed	Not needed.
Birds:						
334	Favorable	Low strength, piping.	Favorable	Wetness, floods, percs slowly.	Not needed	Not needed.
Hurst:						
338A, 338B2	Favorable	Hard to pack, low strength, shrink-swell.	Deep to water	Percs slowly	Percs slowly	Percs slowly.
Belknap:						
382	Favorable	Hard to pack, piping.	Favorable	Floods	Not needed	Not needed.
Piopolis:						
420, W420	Favorable	Low strength	Favorable	Floods, wetness.	Not needed	Not needed.
Karnak:						
426	Favorable	Compressible, low strength, shrink-swell.	Slow refill	Poor outlets, percs slowly, wetness.	Not needed	Not needed.
Burnside:						
427	Seepage, depth to rock.	Large stones	Deep to water	Not needed	Not needed	Favorable.
Coffeen:						
428	Seepage	Low strength, piping.	Deep to water	Floods, wetness.	Piping, wetness.	Not needed.
Raddle:						
430A	Seepage	Low strength, piping, erodes easily.	Deep to water	Not needed	Erodes easily, piping.	Favorable.
Ware:						
456, F456	Seepage	Piping	Deep to water, cutbanks cave.	Not needed	Not needed	Favorable.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Booker:						
457	Favorable	Shrink-swell, compressible, low strength.	Slow refill	Percs slowly, wetness.	Percs slowly, wetness.	Percs slowly, wetness.
W457	Favorable	Shrink-swell, compressible, low strength.	Slow refill	Floods, percs slowly, wetness.	Percs slowly, wetness.	Percs slowly, wetness.
Urban land: 533.						
Bowdre:						
589	Seepage	Seepage, piping.	Deep to water	Wetness, percs slowly.	Percs slowly, wetness.	Percs slowly, wetness.
Cairo:						
590	Seepage	Shrink-swell	Favorable	Floods, wetness, percs slowly.	Not needed	Not needed.
Medway:						
682, F682	Seepage	Piping	Deep to water	Floods, poor outlets.	Not needed	Not needed.
Banlic:						
787	Favorable	Low strength, piping.	Slow refill	Percs slowly	Not needed	Favorable.
Orthents, silty:						
801	Favorable	Low strength, piping.	Deep to water	Favorable	Erodes easily	Favorable.
Orthents, loamy:						
802C, 802G	Favorable	Large stones	No water	Not needed	Complex slope, large stones.	Large stones, erodes easily.
Orthents, clayey:						
805	Favorable	Shrink-swell, unstable fill.	Favorable	Percs slowly, floods.	Not needed	Not needed.
Hosmer:						
[1]850D:						
Hosmer part	Favorable	Low strength, piping, erodes easily.	Deep to water	Not needed	Percs slowly, erodes easily, complex slope.	Percs slowly, erodes easily.
Hickory part	Slope	Low strength, shrink-swell.	No water	Not needed	Slope, erodes easily.	Slope, erodes easily.
[1]850D3:						
Hosmer part	Favorable	Low strength, piping, erodes easily.	Deep to water	Not needed	Percs slowly, erodes easily, complex slope.	Percs slowly, erodes easily.
Hickory part	Slope	Low strength, shrink-swell.	No water	Not needed	Slope, erodes easily.	Slope, erodes easily.
Hickory:						
[1]850E:						
Hickory part	Slope	Low strength, shrink-swell.	No water	Not needed	Slope, erodes easily.	Slope, erodes easily.
Hosmer part	Favorable	Low strength, piping, erodes easily.	Deep to water	Not needed	Percs slowly, erodes easily, complex slope.	Percs slowly, erodes easily.
[1]850E3:						
Hickory part	Slope	Low strength, shrink-swell.	No water	Not needed	Slope, erodes easily.	Slope, erodes easily.

See footnotes at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Hickory:						
Hosmer part	Favorable	Low strength, piping, erodes easily.	Deep to water	Not needed	Percs slowly, erodes easily, complex slope.	Percs slowly, erodes easily.
Alford:						
[1]852E:						
Alford part	Seepage	Low strength, erodes easily.	No water	Not needed	Complex slope, erodes easily.	Erodes easily.
Wellston part	Seepage, depth to rock.	Piping, hard to pack, erodes easily.	No water	Not needed	Depth to rock, slope, erodes easily.	Erodes easily, slope.
[1]852G:						
Alford part	Seepage	Low strength, erodes easily.	No water	Not needed	Complex slope, erodes easily.	Erodes easily.
Wellston part	Seepage, depth to rock.	Piping, hard to pack, erodes easily.	No water	Not needed	Depth to rock, slope, erodes easily.	Erodes easily, slope.
Ava:						
[1]929C3:						
Ava part	Favorable	Low strength	Deep to water	Not needed	Erodes easily, percs slowly.	Erodes easily, slope.
Hickory part	Slope	Low strength, shrink-swell.	No water	Not needed	Slope, erodes easily.	Slope, erodes easily.
Hickory:						
[1]929D2:						
Hickory part	Slope	Low strength, shrink-swell.	No water	Not needed	Slope, erodes easily.	Slope, erodes easily.
Ava part	Favorable	Low strength	Deep to water	Not needed	Erodes easily, percs slowly.	Erodes easily, slope.
Goss:						
[1]930G:						
Goss part	Slope, seepage.	Compressible, hard to pack.	No water	Not needed	Complex slope	Droughty, slope.
Alford part	Seepage	Low strength, erodes easily.	No water	Not needed	Complex slope, erodes easily.	Erodes easily.
Neotoma:						
[2]976G	Depth to rock, slope, seepage.	Thin layer, piping, seepage.	No water	Not needed	Slope, depth to rock.	Slope.
[1]977E:						
Neotoma part	Depth to rock, slope, seepage.	Thin layer, piping, seepage.	No water	Not needed	Slope, depth to rock.	Slope.
Wellston part	Seepage, depth to rock.	Piping, hard to pack, erodes easily.	No water	Not needed	Depth to rock, slope, erodes easily.	Erodes easily, slope.
[1]977G:						
Neotoma part	Depth to rock, slope, seepage.	Thin layer, piping, seepage.	No water	Not needed	Slope, depth to rock.	Slope.
Wellston part	Seepage, depth to rock.	Piping, hard to pack, erodes easily.	No water	Not needed	Depth to rock, slope, erodes easily.	Erodes easily, erodes easily.
Alford:						
[1]999D:						
Alford part	Seepage	Low strength, erodes easily.	No water	Not needed	Complex slope, erodes easily.	Erodes easily.

See footnotes at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Alford:						
Hickory part---	Slope-----------	Low strength, shrink-swell.	No water--------	Not needed------	Slope, erodes easily.	Slope, erodes easily.
[1]999D3:						
Alford part----	Seepage---------	Low strength, erodes easily.	No water--------	Not needed------	Complex slope, erodes easily.	Erodes easily.
Hickory part---	Slope-----------	Low strength, shrink-swell.	No water--------	Not needed------	Slope, erodes easily.	Slope, erodes easily.
Hickory:						
[1]999E:						
Hickory part---	Slope-----------	Low strength, shrink-swell.	No water--------	Not needed------	Slope, erodes easily	Slope, erodes easily.
Alford part----	Seepage---------	Low strength, erodes easily.	No water--------	Not needed------	Complex slope, erodes easily.	Erodes easily.
[1]999E3:						
Hickory part---	Slope-----------	Low strength, shrink-swell.	No water--------	Not needed------	Slope, erodes easily.	Slope, erodes easily.
Alford part----	Seepage---------	Low strength, erodes easily.	No water--------	Not needed------	Complex slope, erodes easily.	Erodes easily.
Mine dump:						
M.D.						
Quarry:						
Qu.						

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior characteristics of the mapping unit.

[2]Rock outcrop part not evaluated.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than and > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Hoyleton:											
3A, 3B2	0-19	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-35	5-15
	19-46	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	95-100	90-100	40-55	20-30
	46-60	Silt loam, loam, clay loam.	CL	A-6, A-7	0	100	95-100	90-100	80-95	30-45	15-25
Hickory:											
8E, 8E3, 8G	0-8	Silt loam	CL-ML, CL	A-6, A-4	0-5	95-100	90-100	90-100	85-95	20-35	5-15
	8-47	Clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-95	75-90	30-50	15-30
	47-60	Clay loam, sandy loam, loam.	CL-ML, CL	A-4, A-6	0-5	85-100	85-95	80-95	60-80	20-40	5-20
Wynoose:											
12	0-14	Silt loam	CL-ML, CL	A-4, A-6	0	100	95-100	90-100	75-95	20-35	5-15
	14-32	Silty clay, clay, silty clay loam.	CL	A-7, A-6	0	100	95-100	90-100	80-95	30-50	15-30
	32-58	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-4	0	100	95-100	90-100	75-90	25-40	5-15
	58-60	Clay loam, loam	CL	A-6, A-7	0-10	100	90-100	90-100	75-90	20-45	10-25
Bluford:											
13A, 13B	0-18	Silt loam	CL, CL-ML	A-6, A-4	0	100	95-100	95-100	85-100	20-35	5-15
	18-46	Silty clay loam, silty clay.	CL	A-7, A-6	0	100	95-100	95-100	80-100	30-45	10-25
	46-60	Silt loam, loam, clay loam.	CL-ML, CL	A-6, A-4	0-5	100	95-100	90-100	70-95	25-40	5-20
Ava:											
14B	0-7	Silt loam	CL, CL-ML	A-6	0	100	95-100	95-100	85-100	25-40	5-15
	7-27	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	95-100	30-45	15-25
	27-60	Silty clay loam, silt loam, loam.	CL, CL-ML	A-4, A-6, A-7	0	100	95-100	90-100	70-90	20-45	5-20
14C3	0-7	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	95-100	30-50	15-30
	7-27	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	95-100	30-45	15-25
	27-60	Silty clay loam, silt loam, loam.	CL, CL-ML	A-4, A-6, A-7	0	100	95-100	90-100	70-90	20-45	5-20
Darwin:											
71, F71, W71	0-11	Silty clay	CH	A-7	0	100	100	100	95-100	50-85	30-55
	11-48	Silty clay, clay	CH	A-7	0	100	100	100	95-100	50-85	30-55
	48-60	Silty clay loam, silty clay.	CL, CH	A-7, A-6	0	100	100	95-100	90-100	35-70	20-45
71+	0-11	Silt loam	ML, CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	20-35	3-15
	11-48	Silty clay, clay	CH	A-7	0	100	100	100	95-100	50-85	30-55
	48-60	Silty clay loam, silty clay.	CL, CH	A-7, A-6	0	100	100	95-100	90-100	35-70	20-45
Okaw:											
84	0-15	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
	15-54	Silty clay, clay, silty clay loam.	CH	A-7	0	100	95-100	95-100	90-100	50-80	30-55
	54-60	Silty clay loam, silty clay, clay.	CL, CH	A-7	0	100	100	95-100	90-100	40-60	20-40
Jacob:											
85, W85	0-4	Clay	CH	A-7	0	100	100	100	95-100	54-70	33-45
	4-50	Clay, silty clay	CH	A-7	0	100	100	100	95-100	50-70	30-45

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Bonnie:											
108----------------	0-7	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	90-100	27-34	8-12
	7-31	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	90-100	27-34	8-12
	31-60	Stratified sand to silty clay.	ML, CL, SM, SC	A-2, A-4, A-6	0	100	100	90-100	30-90	20-39	NP-15
Racoon:											
109----------------	0-25	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-35	5-15
	25-61	Silty clay loam	CL	A-7, A-6	0	100	100	95-100	90-100	35-50	15-30
	61-66	Stratified loamy fine sand to silty clay.	SM, ML, CL, SC	A-2, A-4, A-6, A-7	0	100	90-100	55-98	25-90	<45	NP-25
Colp:											
122A, 122B2, 122C2, 122D--------	0-12	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-35	5-15
	12-60	Silty clay loam, clay, silty clay.	CL, CH	A-7	0	100	100	95-100	95-100	40-65	20-45
122C3--------------	0-12	Silty clay loam	CL	A-7, A-6	0	100	100	95-100	90-100	30-48	15-25
	12-60	Silty clay loam, clay, silty clay.	CL, CH	A-7	0	100	100	95-100	95-100	40-65	20-45
Alvin:											
131B, 131C3, 131E-	0-11	Very fine sandy loam.	SM, ML	A-4, A-2	0	100	100	80-95	30-60	<25	NP-4
	11-38	Very fine sandy loam, sandy loam, sandy clay loam.	SC, CL, SM, ML	A-4, A-6, A-2	0	100	100	90-100	20-80	15-38	NP-13
	38-60	Stratified sandy loam to fine sand.	SP-SM, SM, SP	A-2, A-3	0-5	95-100	90-100	70-95	4-35	<20	NP-4
Starks:											
132----------------	0-11	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	95-100	85-100	22-35	5-15
	11-36	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	80-100	35-45	15-24
	36-50	Sandy clay loam, loam, silty clay loam.	CL, SC, CL-ML, SM-SC	A-4, A-6	0	95-100	90-100	80-95	40-80	20-40	6-17
	50-60	Stratified loamy sand to silt loam.	SM, SC, ML, CL	A-2, A-4, A-6	0-5	90-100	80-95	40-90	30-60	<30	NP-15
Camden:											
134A, 134B2, 134C2, 134C3, 134D	0-9	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	95-100	90-100	80-95	25-35	5-15
	9-47	Silty clay loam, clay loam.	CL	A-6, A-7	0	95-100	90-100	90-100	60-90	35-45	15-25
	47-60	Sandy loam, loam, silt loam.	SM, SC, ML, CL	A-2, A-4, A-6	0	90-100	80-95	40-90	30-80	<35	NP-15
Gorham:											
162----------------	0-13	Silty clay loam	CL	A-6, A-7	0	100	95-100	90-100	70-90	35-50	15-25
	13-39	Silty clay loam, silty clay, clay loam.	CL	A-6, A-7	0	100	95-100	90-100	75-90	35-50	15-30
	39-60	Stratified sandy clay loam to loamy sand.	SM, SP-SM, SC, SM-SC	A-2, A-4	0	100	65-90	55-80	10-50	<30	NP-10
Stoy:											
164A, 164B, 164C2-	0-14	Silt loam--------	ML, CL	A-4, A-6	0	100	100	95-100	90-100	23-33	3-14
	14-56	Silty clay loam	CL, CH	A-7	0	100	100	95-100	90-100	44-55	21-32
	56-60	Silt loam--------	CL	A-6, A-7	0	100	100	95-100	90-100	31-43	13-24

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Weir:											
165	0-13	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	23-35	6-17
	13-52	Silty clay loam	CL	A-7, A-6	0	100	100	95-100	90-100	35-50	15-29
	52-60	Silt loam	CL	A-4, A-6	0	100	100	95-100	90-100	22-30	9-16
Dupo:											
180	0-7	Silt loam	ML, CL, CL-ML	A-4, A-6	0	100	100	100	95-100	20-35	1-15
	7-29	Silt loam	ML, CL, CL-ML	A-4, A-6	0	100	100	100	95-100	20-35	5-15
	29-60	Silty clay, clay, silty clay loam.	CL, CH	A-7, A-6	0	100	100	100	98-100	35-55	15-30
Sexton:											
208	0-15	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-40	6-17
	15-42	Silty clay loam	CL	A-7, A-6	0	100	100	95-100	90-100	35-50	15-28
	42-60	Stratified sandy loam to silty clay loam.	ML, CL, SM, SC	A-4, A-2, A-6	0	100	90-100	60-90	25-90	3-40	NP-25
Hosmer:											
214B, 214C2, 214D2	0-9	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	80-100	25-35	5-15
	9-25	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	80-100	25-35	5-15
	25-60	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	80-100	25-35	5-15
214C3, 214D3	0-9	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	80-100	25-35	5-15
	9-25	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	80-100	25-35	5-15
	25-60	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	80-100	25-35	5-15
St. Charles:											
243B	0-10	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	95-100	95-100	20-35	5-15
	10-55	Silty clay loam, silt loam.	CL	A-6	0	100	100	95-100	90-100	25-40	10-25
	55-60	Stratified silt loam to sandy loam.	ML, SC, SM, CL	A-2, A-4	0-5	90-100	80-90	60-90	30-70	<25	3-10
Alford:											
308B2, 308C2, 308D2, 308E, 308G	0-8	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	25-40	5-15
	8-52	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	80-100	30-50	15-30
	52-60	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	25-40	5-15
308C3, 308D3, 308E3	0-8	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	80-100	30-50	15-30
	8-52	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	80-100	30-50	15-30
	52-60	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	25-40	5-15
Haymond:											
331	0-8	Silt loam	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
	8-32	Silt loam	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
	32-60	Silt loam	ML	A-4	0	95-100	90-100	80-100	65-90	27-36	4-10
Wakeland:											
333	0-13	Silt loam	CL, ML	A-4	0	100	100	90-100	80-90	27-36	4-10
	13-60	Silt loam	CL, ML	A-4	0	100	100	90-100	80-90	27-36	4-10
Birds:											
334	0-7	Silt loam	CL	A-4, A-6	0	100	95-100	90-100	80-100	24-34	8-15
	7-60	Silt loam	CL	A-4, A-6	0	100	95-100	90-100	80-100	24-34	8-15
Hurst:											
338A, 338B2	0-20	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	24-35	6-14
	20-60	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	100	100	95-100	90-100	30-45	15-25

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Belknap:											
382	0-8	Silt loam	ML, CL, CL-ML	A-4	0	100	95-100	90-100	80-95	21-29	2-8
	8-60	Silt loam	ML, CL-ML, CL	A-4	0	100	95-100	90-100	80-95	22-32	NP-10
Piopolis:											
420, W420	0-7	Silty clay loam	CL	A-6	0	100	100	90-100	75-95	30-40	15-20
	7-60	Silty clay loam	CL	A-6	0	100	100	90-100	75-95	30-40	15-20
	49-60	Silty clay loam, silt loam.	CL	A-6	0	100	100	90-100	70-95	30-40	15-20
Karnak:											
426	0-6	Silty clay	CH, CL	A-7	0	100	100	100	95-100	45-80	25-45
	6-60	Silty clay, clay	CH, MH	A-7	0	100	100	100	95-100	50-80	23-38
Burnside:											
427	0-18	Silt loam	ML, CL, CL-ML	A-4	0-10	100	100	80-95	75-95	20-35	2-10
	18-60	Flaggy loam, flaggy sandy loam, flaggy silt loam.	SC, GC, SM, GM	A-2, A-4	10-60	35-80	30-60	30-50	26-45	<20	NP-10
Coffeen:											
428	0-17	Silt loam	ML, CL	A-4, A-6	0	100	100	90-100	85-100	25-40	3-15
	17-48	Silt loam	ML, CL	A-4	0	100	100	90-100	80-95	25-35	3-10
	48-60	Stratified silt loam to sandy loam.	ML, SM, SC, CL	A-4, A-2	0	100	90-100	85-100	30-85	20-30	3-10
Raddle:											
430A	0-12	Silt loam	CL	A-4, A-6	0	100	100	95-100	85-100	25-35	8-15
	12-60	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	80-100	20-30	4-14
Ware:											
456	0-21	Loam	ML, CL-ML, CL	A-4	0	100	100	95-100	50-70	20-36	2-10
	21-60	Stratified silt loam to sand.	SM, ML, SM-SC, CL-ML	A-4, A-2	0	100	100	60-90	10-60	<25	NP-6
F456	0-21	Sandy loam	SM, SM-SC	A-2	0	100	100	80-95	20-30	<20	NP-5
	21-60	Stratified silt loam to sand.	SM, ML, SM-SC, CL-ML	A-4, A-2	0	100	100	60-90	10-60	<25	NP-6
Booker:											
457, W457	0-12	Silty clay	CL, CH	A-7	0	100	100	95-100	95-100	45-70	30-45
	12-60	Clay	CH	A-7	0	100	100	100	95-100	50-75	35-55
Urban land: 533.											
Bowdre:											
589	0-15	Silty clay	MH, CH	A-7	0	100	100	95-100	90-95	51-65	28-40
	15-19	Silt loam, loam	CL-ML, CL, ML	A-4, A-6	0	100	100	90-100	70-90	25-35	5-12
	19-35	Sandy loam, silt loam, loam.	SM, CL, CL-ML, SM-SC	A-2, A-4	0	100	100	60-100	30-90	20-30	5-10
	35-60	Loamy sand, sandy loam.	SM, SM-SC	A-2, A-4	0	100	100	60-75	15-40	<25	NP-5

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Cairo:											
590	0-36	Silty clay	CH	A-7	0	100	100	95-100	90-100	51-80	31-55
	36-60	Sandy loam, loamy fine sand, fine sand.	SM, SC, SM-SC	A-2, A-4	0	100	65-100	50-80	15-45	15-30	NP-10
Medway:											
682, F682	0-17	Silty clay loam	CL	A-4, A-6, A-7	0	100	100	90-100	70-80	35-50	10-20
	17-36	Loam, silt loam, silty clay loam.	ML, CL	A-4, A-6, A-7	0	95-100	80-95	75-90	70-90	20-48	4-20
	36-60	Loam, sandy loam, gravelly loam.	ML, CL, SM	A-4, A-2	0	80-95	70-90	40-70	30-60	<30	NP-10
Banlic:											
787	0-17	Silt loam	ML, CL, CL-ML	A-4	0	100	95-100	90-100	80-95	21-29	3-9
	17-50	Silt loam	ML, CL-ML, CL	A-4	0	100	95-100	90-100	80-95	22-32	3-10
	50-60	Silt loam	ML, CL-ML, CL	A-4	0	100	95-100	90-100	80-95	22-32	3-10
Orthents, silty:											
801	0-60	Variable	CL, ML	A-6, A-4, A-7	0	100	100	90-100	80-100	30-47	7-28
Orthents, loamy:											
802C, 802G	0-60	Variable	CL, ML	A-4, A-6, A-7	30-50	85-95	75-95	70-95	60-95	25-45	4-22
Orthents, clayey:											
805	0-60	Variable	CH	A-7	0	100	100	100	95-100	50-80	31-55
Hosmer:											
[1]850D:											
Hosmer part	0-9	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	80-100	25-35	5-15
	9-25	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	80-100	25-35	5-15
	25-60	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	80-100	25-35	5-15
Hickory part	0-8	Silt loam	CL-ML, CL	A-6, A-4	0-5	95-100	90-100	90-100	85-95	20-35	5-15
	8-47	Clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-95	75-90	30-50	15-30
	47-60	Clay loam, sandy loam, loam.	CL-ML, CL	A-4, A-6	0-5	85-100	85-95	80-95	60-80	20-40	5-20
[1]850D3:											
Hosmer part	0-9	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	80-100	25-35	5-15
	9-25	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	80-100	25-35	5-15
	25-60	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	80-100	25-35	5-15
Hickory part	0-8	Clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-95	75-90	30-50	15-30
	8-47	Clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-95	75-90	30-50	15-30
	47-60	Clay loam, sandy loam, loam.	CL-ML, CL	A-4, A-6	0-5	85-100	85-95	80-95	60-80	20-40	5-20
Hickory:											
[1]850E:											
Hickory part	0-8	Silt loam	CL-ML, CL	A-6, A-4	0-5	95-100	90-100	90-100	85-95	20-35	5-15
	8-47	Clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-95	75-90	30-50	15-30
	47-60	Clay loam, sandy loam, loam.	CL-ML, CL	A-4, A-6	0-5	85-100	85-95	80-95	60-80	20-40	5-20

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Hickory:											
Hosmer part-----	0-9	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	80-100	25-35	5-15
	9-25	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	80-100	25-35	5-15
	25-60	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	80-100	25-35	5-15
[1]850E3:											
Hickory part----	0-8	Clay loam--------	CL	A-6, A-7	0-5	95-100	90-100	80-95	75-90	30-50	15-30
	8-47	Clay loam--------	CL	A-6, A-7	0-5	95-100	90-100	80-95	75-90	30-50	15-30
	47-60	Clay loam, sandy loam, loam.	CL-ML, CL	A-4, A-6	0-5	85-100	85-95	80-95	60-80	20-40	5-20
Hosmer part-----	0-9	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	80-100	25-35	5-15
	9-25	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	80-100	25-35	5-15
	25-60	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	80-100	25-35	5-15
Alford:											
[1]852E:											
Alford part-----	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	25-40	5-15
	8-52	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	80-100	30-50	15-30
	52-60	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	25-40	5-15
Wellston part---	0-6	Silt loam--------	ML	A-4	0	95-100	90-100	85-100	70-95	25-35	3-10
	6-40	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0-5	75-100	70-100	60-95	60-90	25-40	5-20
	40-50	Silt loam, loam, gravelly loam.	CL-ML, CL, SC, SM-SC	A-4, A-6	0-10	65-90	65-90	60-90	40-65	20-35	5-15
	50	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
[1]852G:											
Alford part-----	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	25-40	5-15
	8-52	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	80-100	30-50	15-30
	52-60	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	25-40	5-15
Wellston part---	0-6	Silt loam--------	ML	A-4	0	95-100	90-100	85-100	70-95	25-35	3-10
	6-40	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0-5	75-100	70-100	60-95	60-90	25-40	5-20
	40-50	Silt loam, loam, gravelly loam.	CL-ML, CL, SC, SM-SC	A-4, A-6	0-10	65-90	65-90	60-90	40-65	20-35	5-15
	50	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ava:											
[1]929C3:											
Ava part---------	0-7	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	95-100	30-50	15-30
	7-27	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	95-100	30-45	15-25
	27-60	Silty clay loam, silt loam, loam.	CL, CL-ML	A-4, A-6, A-7	0	100	95-100	90-100	70-90	20-45	5-20
Hickory part----	0-8	Clay loam--------	CL	A-6, A-7	0-5	95-100	90-100	80-95	75-90	30-50	15-30
	8-47	Clay loam--------	CL	A-6, A-7	0-5	95-100	90-100	80-95	75-90	30-50	15-30
	47-60	Clay loam, sandy loam, loam.	CL-ML, CL	A-4, A-6	0-5	85-100	85-95	80-95	60-80	20-40	5-20
Hickory:											
[1]929D2:											
Hickory part----	0-8	Silt loam--------	CL-ML, CL	A-6, A-4	0-5	95-100	90-100	90-100	85-95	20-35	5-15
	8-47	Clay loam--------	CL	A-6, A-7	0-5	95-100	90-100	80-95	75-90	30-50	15-30
	47-60	Clay loam, sandy loam, loam.	CL-ML, CL	A-4, A-6	0-5	85-100	85-95	80-95	60-80	20-40	5-20

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Hickory:											
Ava part	0-7	Silt loam	CL, CL-ML	A-6	0	100	95-100	95-100	85-100	25-40	5-15
	7-27	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	95-100	30-45	15-25
	27-60	Silty clay loam, silt loam, loam.	CL, CL-ML	A-4, A-6, A-7	0	100	95-100	90-100	70-90	20-45	5-20
Goss:											
[1]930G:											
Goss part	0-3	Cherty silt loam	ML, CL	A-4	0-10	65-90	65-90	65-90	65-85	20-30	2-8
	3-23	Cherty silt loam, cherty silty clay loam.	GM, GC	A-2	10-40	40-60	35-55	30-50	25-35	20-30	2-8
	23-60	Cherty silty clay loam, cherty silty clay, cherty clay.	GC	A-7	10-45	45-70	40-65	40-50	35-45	50-70	30-40
Alford part	0-8	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	25-40	5-15
	8-52	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	80-100	30-50	15-30
	52-60	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	25-40	5-15
Neotoma:											
[1]976G	0-20	Channery loam	ML, SM, GM	A-4	10-30	55-85	50-80	50-75	45-70	30-40	5-10
	20-30	Channery silt loam, channery loam, very channery silt loam.	ML, SM, GM	A-4	10-50	50-80	45-80	45-70	40-60	25-40	3-10
	30-48	Very flaggy loam, very flaggy sandy loam, channery silt loam.	GM	A-2, A-4	40-85	40-65	35-60	30-50	25-45	<35	NP-8
	48	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
[1]977E:											
Neotoma part	0-20	Channery loam	ML, SM, GM	A-4	10-30	55-85	50-80	50-75	45-70	30-40	5-10
	20-30	Channery silt loam, channery loam, very channery silt loam.	ML, SM, GM	A-4	10-50	50-80	45-80	45-70	40-60	25-40	3-10
	30-48	Very flaggy loam, very flaggy sandy loam, channery silt loam.	GM	A-2, A-4	40-85	40-65	35-60	30-50	25-45	<35	NP-8
	48	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Wellston part	0-6	Silt loam	ML	A-4	0	95-100	90-100	85-100	70-95	25-35	3-10
	6-29	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0-5	75-100	70-100	60-95	60-90	25-40	5-20
	29-50	Silt loam, loam, gravelly loam.	CL-ML, CL, SC, SM-SC	A-4, A-6	0-10	65-90	65-90	60-90	40-65	20-35	5-15
	50	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Neotoma:											
[1]977G:											
Neotoma part-----	0-20	Channery loam----	ML, SM, GM	A-4	10-30	55-85	50-80	50-75	45-70	30-40	5-10
	20-30	Channery silt loam, channery loam, very channery silt loam.	ML, SM, GM	A-4	10-50	50-80	45-80	45-70	40-60	25-40	3-10
	30-48	Very flaggy loam, very flaggy sandy loam, channery silt loam.	GM	A-2, A-4	40-85	40-65	35-60	30-50	25-45	<35	NP-8
	48	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Wellston part----	0-6	Silt loam--------	ML	A-4	0	95-100	90-100	85-100	70-95	25-35	3-10
	6-29	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0-5	75-100	70-100	60-95	60-90	25-40	5-20
	29-50	Silt loam, loam, gravelly loam.	CL-ML, CL, SC, SM-SC	A-4, A-6	0-10	65-90	65-90	60-90	40-65	20-35	5-15
	50	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Alford:											
[1]999D:											
Alford part------	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	25-40	5-15
	8-52	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	80-100	30-50	15-30
	52-60	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	25-40	5-15
Hickory part-----	0-8	Silt loam--------	CL-ML, CL	A-6, A-4	0-5	95-100	90-100	90-100	85-95	20-35	5-15
	8-47	Clay loam--------	CL	A-6, A-7	0-5	95-100	90-100	80-95	75-90	30-50	15-30
	47-60	Clay loam, sandy loam, loam.	CL-ML, CL	A-4, A-6	0-5	85-100	85-95	80-95	60-80	20-40	5-20
[1]999D3:											
Alford part------	0-8	Silty clay loam	CL	A-7, A-6	0	100	100	90-100	80-100	30-50	15-30
	8-52	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	80-100	30-50	15-30
	52-60	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	25-40	5-15
Hickory part-----	0-8	Clay loam--------	CL	A-6, A-7	0-5	95-100	90-100	80-95	75-90	30-50	15-30
	8-47	Clay loam--------	CL	A-6, A-7	0-5	95-100	90-100	80-95	75-90	30-50	15-30
	47-60	Clay loam, sandy loam, loam.	CL-ML, CL	A-4, A-6	0-5	85-100	85-95	80-95	60-80	20-40	5-20
Hickory:											
[1]999E:											
Hickory part-----	0-8	Silt loam--------	CL-ML, CL	A-6, A-4	0-5	95-100	90-100	90-100	85-95	20-35	5-15
	8-47	Clay loam--------	CL	A-6, A-7	0-5	95-100	90-100	80-95	75-90	30-50	15-30
	47-60	Clay loam, sandy loam, loam.	CL-ML, CL	A-4, A-6	0-5	85-100	85-95	80-95	60-80	20-40	5-20
Alford part------	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	25-40	5-15
	8-52	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	80-100	30-50	15-30
	52-60	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	25-40	5-15

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
[1]999E3:											
Hickory part----	0-8	Clay loam--------	CL	A-6, A-7	0-5	95-100	90-100	80-95	75-90	30-50	15-30
	8-47	Clay loam--------	CL	A-6, A-7	0-5	95-100	90-100	80-95	75-90	30-50	15-30
	47-60	Clay loam, sandy loam, loam.	CL-ML, CL	A-4, A-6	0-5	85-100	85-95	80-95	60-80	20-40	5-20
Alford part-----	0-8	Silty clay loam	CL	A-7, A-6	0	100	100	90-100	80-100	30-50	15-30
	8-52	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	80-100	30-50	15-30
	52-60	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	25-40	5-15
Mine dump: M.D.											
Quarry: Qu.											

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior characteristics of the mapping unit.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than. The erosion tolerance factor (T) is for the entire profile. Absence of an entry means data were not estimated. Dashes indicate that data were not available]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	In/hr	In/in	pH						
Hoyleton:										
3A, 3B2	0-19	0.6-2.0	0.22-0.24	4.5-5.5	Moderate	High	High	0.37	3	6
	19-46	0.06-0.2	0.13-0.20	4.5-5.5	High	High	High	0.37		
	46-60	0.06-0.2	0.17-0.22	5.1-6.5	Moderate	High	Moderate	0.37		
Hickory:										
8E, 8E3, 8G	0-8	0.6-2.0	0.20-0.22	4.5-6.0	Low	Low	High	0.32	5	6
	8-47	0.6-2.0	0.15-0.19	5.1-5.5	Moderate	Moderate	Moderate	0.32		
	47-60	0.6-2.0	0.11-0.19	5.1-8.4	Low	Low	Low	0.32		
Wynoose:										
12	0-14	0.2-0.6	0.22-0.24	3.6-5.5	Moderate	High	High	---	---	6
	14-32	<0.06	0.11-0.13	3.6-5.5	High	High	High	---		
	32-58	0.06-0.2	0.18-0.20	3.6-5.5	Moderate	High	High	---		
	58-60	0.06-0.2	0.14-0.16	4.5-6.0	Moderate	High	High	---		
Bluford:										
13A, 13B	0-18	0.6-2.0	0.22-0.24	4.5-5.5	Moderate	High	High	0.43	3	6
	18-46	0.2-0.6	0.11-0.20	4.5-5.5	Moderate	High	High	0.43		
	46-60	0.06-0.2	0.11-0.15	4.5-5.5	Moderate	High	High	0.43		
Ava:										
14B	0-7	0.2-0.6	0.22-0.24	3.6-5.5	Moderate	Moderate	High	0.43	4	6
	7-27	0.2-0.6	0.18-0.20	3.6-5.5	Moderate	Moderate	High	0.43		
	27-60	<0.06	0.09-0.10	3.6-5.5	Moderate	Moderate	High	0.43		
14C3	0-7	0.2-0.6	0.20-0.22	3.6-5.5	Moderate	Moderate	High	0.43	3	7
	7-27	0.2-0.6	0.18-0.20	3.6-5.5	Moderate	Moderate	High	0.43		
	27-60	<0.06	0.09-0.10	3.6-5.5	Moderate	Moderate	High	0.43		
Darwin:										
71, F71, W71	0-11	<0.06	0.11-0.14	6.1-7.8	Very high	High	Low	---	---	4
	11-48	<0.06	0.11-0.14	6.1-7.8	Very high	High	Low	---		
	48-60	0.06-0.2	0.10-0.20	7.4-8.4	High	High	Low	---		
71+	0-11	0.6-2.0	0.22-0.24	6.1-7.8	Moderate	High	Low	---	---	6
	11-48	<0.06	0.11-0.14	6.1-7.8	Very high	High	Low	---		
	48-60	0.06-0.2	0.10-0.20	7.4-8.4	High	High	Low	---		
Okaw:										
84	0-15	0.2-0.6	0.22-0.24	4.5-6.5	Low	High	High	0.43	3	6
	15-54	<0.06	0.09-0.18	3.6-6.0	High	High	High	0.32		
	54-60	<0.06	0.08-0.20	5.6-7.3	High	High	Moderate	0.32		
Jacob:										
85, W85	0-4	0.06-0.2	0.11-0.13	5.1-6.5	Very high	High	Moderate	---	---	8
	4-50	<0.06	0.09-0.13	3.6-5.5	Very high	High	High	---		
Bonnie:										
108	0-7	0.6-2.0	0.22-0.24	6.6-7.3	Low	High	Low	---	---	6
	7-31	0.06-2.0	0.20-0.22	4.5-5.5	Low	High	High	---		
	31-60	0.06-2.0	0.18-0.20	5.1-7.3	Low	High	Moderate	---		
Racoon:										
109	0-25	0.2-0.6	0.22-0.24	5.1-7.3	Moderate	High	Moderate	---	---	6
	25-61	0.06-0.2	0.18-0.20	4.5-5.5	High	High	High	---		
	61-66	0.2-0.6	0.09-0.17	6.1-7.3	Moderate	High	Low	---		
Colp:										
122A, 122B2, 122C2, 122D	0-12	0.2-0.6	0.22-0.24	3.6-5.5	Moderate	Moderate	High	0.43	3	6
	12-60	0.06-0.2	0.11-0.20	3.6-6.0	High	High	High	0.43		
122C3	0-12	0.2-0.6	0.20-0.22	3.6-5.5	High	High	High	0.43	2	7
	12-60	0.06-0.2	0.11-0.20	3.6-6.0	High	High	High	0.43		

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodi-bility group
	In	In/hr	In/in	pH						
Alvin:										
131B, 131C3, 131E	0-11	2.0-6.0	0.14-0.20	5.1-6.5	Low	Low	High	0.24	5	3
	11-38	0.6-6.0	0.12-0.20	4.5-6.0	Low	Low	High	0.24		
	38-60	6.0-20	0.05-0.13	5.1-7.8	Low	Low	High	0.24		
Starks:										
132	0-11	0.6-2.0	0.22-0.24	5.6-6.5	Moderate	High	Moderate	0.37	5	6
	11-36	0.2-0.6	0.18-0.20	5.1-6.0	Moderate	High	Moderate	0.37		
	36-50	0.6-2.0	0.16-0.19	5.1-6.0	Moderate	High	Moderate	0.37		
	50-60	2.0-6.0	0.08-0.18	5.6-7.3	Very low	Low	Moderate	0.37		
Camden:										
134A, 134B2, 134C2, 134C3, 134D	0-9	0.6-2.0	0.22-0.24	5.1-6.0	Low	Low	Moderate	0.37	5-4	6
	9-47	0.6-2.0	0.16-0.20	5.1-6.0	Moderate	Low	Moderate	0.37		
	47-60	0.6-6.0	0.12-0.18	5.6-7.3	Low	Low	Low	0.37		
Gorham:										
162	0-13	0.2-0.6	0.21-0.23	6.1-7.8	Moderate	High	Low	---	---	4
	13-39	0.2-0.6	0.13-0.20	6.1-7.8	Moderate	High	Low	---		
	39-60	0.6-20	0.05-0.13	6.1-7.8	Very low	High	Low	---		
Stoy:										
164A, 164B, 164C2	0-14	0.2-0.6	0.22-0.24	5.1-6.0	Low	High	Moderate	0.43	3	6
	14-56	0.06-0.2	0.09-0.18	4.5-6.0	Moderate	High	High	0.43		
	56-60	0.2-0.6	0.20-0.22	5.1-6.0	Low	High	Moderate	0.43		
Weir:										
165	0-13	0.2-0.6	0.22-0.24	4.5-6.5	Low	High	High	---	---	6
	13-52	<0.06	0.18-0.20	4.5-5.5	High	High	High	---		
	52-60	0.06-0.2	0.20-0.22	5.6-7.3	Low	High	Moderate	---		
Dupo:										
180	0-7	0.6-2.0	0.22-0.24	5.6-7.3	Low	High	Moderate	---	---	5
	7-29	0.6-2.0	0.20-0.22	5.6-8.4	Low	High	Moderate	---		
	29-60	0.06-0.2	0.08-0.19	6.6-7.8	High	High	Low	---		
Sexton:										
208	0-15	0.2-0.6	0.22-0.24	5.6-6.5	Low	High	Moderate	---	---	6
	15-42	0.06-0.2	0.18-0.20	5.1-6.0	High	High	Moderate	---		
	42-60	0.2-0.6	0.11-0.20	5.6-6.5	Low	High	Moderate	---		
Hosmer:										
214B, 214C2, 214C3, 214D2, 214D3	0-9	0.6-2.0	0.20-0.24	4.5-6.0	Low	Moderate	High	0.43	4-3	5
	9-25	0.6-2.0	0.18-0.22	4.5-5.5	Low	Moderate	High	0.43		
	25-60	<0.06	0.06-0.08	4.5-5.0	Low	Moderate	High	0.43		
St. Charles:										
243B	0-10	0.6-2.0	0.22-0.24	5.6-6.5	Low	Moderate	Moderate	0.37	4	6
	10-55	0.6-2.0	0.18-0.20	5.6-6.0	Moderate	Moderate	Moderate	0.37		
	55-60	0.6-2.0	0.11-0.22	6.6-7.8	Low	Low	Low	0.37		
Alford:										
308B2, 308C2, 308D2, 308E, 308G	0-8	0.6-2.0	0.22-0.24	5.1-7.3	Low	Moderate	Moderate	0.37	5	5
	8-52	0.6-2.0	0.18-0.20	4.5-6.5	Moderate	Moderate	Moderate	0.37		
	52-60	0.6-2.0	0.20-0.22	5.6-7.3	Low	Moderate	Moderate	0.37		
308C3, 308D3, 308E3	0-8	0.6-2.0	0.21-0.23	4.5-6.5	Moderate	Moderate	High	0.37	4	7
	8-52	0.6-2.0	0.18-0.20	4.5-6.5	Moderate	Moderate	Moderate	0.37		
	52-60	0.6-2.0	0.20-0.22	5.6-7.3	Low	Moderate	Moderate	0.37		
Haymond:										
331	0-8	0.6-2.0	0.22-0.24	5.6-7.3	Low	Low	Low	---	---	5
	8-32	0.6-2.0	0.20-0.22	5.6-7.3	Low	Low	Low	---		
	32-60	0.6-2.0	0.20-0.22	6.1-7.3	Low	Low	Low	---		
Wakeland:										
333	0-13	0.6-2.0	0.22-0.24	6.6-7.3	Low	High	Low	---	---	5
	13-60	0.6-2.0	0.20-0.22	6.6-7.3	Low	High	Low	---		

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permea- bility	Available water capacity	Soil reaction	Shrink- swell potential	Risk of corrosion		Erosion factors		Wind erodi- bility group
						Uncoated steel	Concrete	K	T	
	In	In/hr	In/in	pH						
Birds:										
334----------------	0-7	0.06-0.6	0.20-0.24	5.6-7.8	Low--------	High-----	Moderate	---	---	6
	7-60	0.06-0.6	0.20-0.24	5.6-7.8	Low--------	High-----	Moderate	---		
Hurst:										
338A, 338B2--------	0-20	0.2-0.6	0.22-0.24	4.5-5.5	Moderate	High-----	High-----	0.43	3	6
	20-60	<0.06	0.10-0.20	4.5-7.3	High-------	High-----	High-----	0.32		
Belknap:										
382----------------	0-8	0.2-2.0	0.22-0.24	4.5-5.5	Low--------	High-----	High-----	---	---	5
	8-60	0.2-2.0	0.20-0.22	4.5-6.0	Low--------	High-----	High-----	---		
Piopolis:										
420, W420----------	0-7	0.06-0.2	0.21-0.23	5.1-5.5	Moderate	High-----	Moderate	---	---	7
	7-60	0.06-0.2	0.18-0.20	5.1-5.5	Moderate	High-----	Moderate	---		
	49-60	0.06-0.2	0.18-0.20	6.6-7.3	Moderate	High-----	Low-------	---		
Karnak:										
426----------------	0-6	0.06-0.2	0.11-0.14	5.6-6.0	High-------	High-----	Moderate	---	---	4
	6-60	<0.2	0.09-0.13	5.6-7.3	High-------	High-----	Moderate	---		
Burnside:										
427----------------	0-18	0.6-2.0	0.22-0.24	4.5-6.0	Low--------	Low-------	High-----	---	---	5
	18-60	0.6-2.0	0.10-0.16	4.5-5.5	Low--------	Low-------	High-----	---		
Coffeen:										
428----------------	0-17	0.6-2.0	0.22-0.24	5.6-7.3	Low--------	High-----	Moderate	---	---	6
	17-48	0.6-2.0	0.20-0.22	5.6-7.3	Low--------	High-----	Moderate	---		
	48-60	0.6-6.0	0.14-0.22	5.6-7.3	Low--------	High-----	Moderate	---		
Raddle:										
430A---------------	0-12	0.6-2.0	0.22-0.24	5.6-7.3	Low--------	Low-------	Moderate	0.32	5	6
	12-60	0.6-2.0	0.20-0.22	5.6-7.3	Low--------	Moderate	Moderate	0.43		
Ware:										
456, F456----------	0-21	0.6-2.0	0.15-0.24	5.6-8.4	Low--------	Low-------	Moderate	---	---	5
	21-60	2.0-20.0	0.07-0.19	6.1-7.8	Very low--	Low-------	Low-------	---		
Booker:										
457, W457----------	0-12	<0.06	0.12-0.14	5.6-7.3	Very high	High-----	Moderate	---	---	4
	12-60	<0.06	0.09-0.11	5.6-6.5	Very high	High-----	Moderate	---		
Urban land:										
533.										
Bowdre:										
589----------------	0-15	0.06-0.2	0.15-0.20	5.6-7.3	High-------	High-----	Low-------	---	---	---
	15-19	0.2-0.6	0.19-0.22	6.1-8.4	Low--------	High-----	Low-------	---		
	19-35	0.6-2.0	0.15-0.22	6.1-8.4	Low--------	High-----	Low-------	---		
	35-60	2.0-6.0	0.05-0.15	6.1-8.4	Low--------	High-----	Low-------	---		
Cairo:										
590----------------	0-36	<0.06	0.09-0.13	6.1-7.8	High-------	High-----	Low-------	0.28	4	4
	36-60	6.0-20	0.08-0.18	6.1-7.8	Low--------	High-----	Moderate	0.17		
Medway:										
682, F682----------	0-17	0.6-2.0	0.17-0.22	6.5-7.5	Low--------	Low-------	Low-------	---	---	---
	17-36	0.6-2.0	0.14-0.18	6.5-7.5	Low--------	Low-------	Low-------	---		
	36-60	6.0-20.0	0.08-0.15	6.5-7.8	Low--------	Moderate	Low-------	---		
Banlic:										
787----------------	0-17	0.2-0.6	0.22-0.24	4.5-6.5	Low--------	High-----	High-----	---	---	5
	17-50	0.06-0.2	0.20-0.22	4.5-6.0	Low--------	High-----	High-----	---		
	50-60	0.06-0.2	0.11-0.12	4.5-6.0	Low--------	High-----	High-----	---		
Orthents, silty:										
801----------------	0-60	0.06-2.0	0.18-0.22	5.1-6.5	Low--------	High-----	Moderate	0.43	4	6
Orthents, loamy:										
802C, 802G---------	0-60	0.6-2.0	0.10-0.18	3.6-7.8	Moderate	Moderate	High-----	0.43	4	6
Orthents, clayey:										
805----------------	0-60	<0.06	0.08-0.14	3.6-8.4	Very high	High-----	High-----	0.32	3	4

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permea- bility	Available water capacity	Soil reaction	Shrink- swell potential	Risk of corrosion		Erosion factors		Wind erodi- bility group
						Uncoated steel	Concrete	K	T	
	In	In/hr	In/in	pH						
Hosmer:										
[1]850D:										
Hosmer part	0-9	0.6-2.0	0.20-0.24	4.5-6.0	Low	Moderate	High	0.43	4	5
	9-25	0.6-2.0	0.18-0.22	4.5-5.5	Low	Moderate	High	0.43		
	25-60	<0.06	0.06-0.08	4.5-5.0	Low	Moderate	High	0.43		
Hickory part	0-8	0.6-2.0	0.20-0.22	4.5-6.0	Low	Low	High	0.32	5	6
	8-47	0.6-2.0	0.15-0.19	5.1-5.5	Moderate	Moderate	Moderate	0.32		
	47-60	0.6-2.0	0.11-0.19	5.1-8.4	Low	Low	Low	0.32		
[1]850D3:										
Hosmer part	0-9	0.6-2.0	0.20-0.24	4.5-6.0	Low	Moderate	High	0.43	3	5
	9-25	0.6-2.0	0.18-0.22	4.5-5.5	Low	Moderate	High	0.43		
	25-60	<0.06	0.06-0.08	4.5-5.0	Low	Moderate	High	0.43		
Hickory part	0-8	0.6-2.0	0.20-0.22	4.5-6.0	Low	Low	High	0.32	4	6
	8-47	0.6-2.0	0.15-0.19	5.1-5.5	Moderate	Moderate	Moderate	0.32		
	47-60	0.6-2.0	0.11-0.19	5.1-8.4	Low	Low	Low	0.32		
Hickory:										
[1]850E:										
Hickory part	0-8	0.6-2.0	0.20-0.22	4.5-6.0	Low	Low	High	0.32	5	6
	8-47	0.6-2.0	0.15-0.19	5.1-5.5	Moderate	Moderate	Moderate	0.32		
	47-60	0.6-2.0	0.11-0.19	5.1-8.4	Low	Low	Low	0.32		
Hosmer part	0-9	0.6-2.0	0.20-0.24	4.5-6.0	Low	Moderate	High	0.43	4	5
	9-25	0.6-2.0	0.18-0.22	4.5-5.5	Low	Moderate	High	0.43		
	25-60	<0.06	0.06-0.08	4.5-5.0	Low	Moderate	High	0.43		
[1]850E3:										
Hickory part	0-8	0.6-2.0	0.20-0.22	4.5-6.0	Low	Low	High	0.32	4	6
	8-47	0.6-2.0	0.15-0.19	5.1-5.5	Moderate	Moderate	Moderate	0.32		
	47-60	0.6-2.0	0.11-0.19	5.1-8.4	Low	Low	Low	0.32		
Hosmer part	0-9	0.6-2.0	0.20-0.24	4.5-6.0	Low	Moderate	High	0.43	3	5
	9-25	0.6-2.0	0.18-0.22	4.5-5.5	Low	Moderate	High	0.43		
	25-60	<0.06	0.06-0.08	4.5-5.0	Low	Moderate	High	0.43		
Alford:										
[1]852E:										
Alford part	0-8	0.6-2.0	0.22-0.24	5.1-7.3	Low	Moderate	Moderate	0.37	5	5
	8-52	0.6-2.0	0.18-0.20	4.5-6.5	Moderate	Moderate	Moderate	0.37		
	52-60	0.6-2.0	0.20-0.22	5.6-7.3	Low	Moderate	Moderate	0.37		
Wellston part	0-6	0.6-2.0	0.18-0.22	5.1-6.5	Low	Moderate	Moderate	0.37	4	6
	6-40	0.6-2.0	0.17-0.21	4.5-6.0	Low	Moderate	High	0.37		
	40-50	0.6-2.0	0.12-0.17	4.5-6.0	Low	Moderate	High	0.37		
	50	---	---	---	-------	-------	-------	---		
[1]852G:										
Alford part	0-8	0.6-2.0	0.22-0.24	5.1-7.3	Low	Moderate	Moderate	0.37	5	5
	8-52	0.6-2.0	0.18-0.20	4.5-6.5	Moderate	Moderate	Moderate	0.37		
	52-60	0.6-2.0	0.20-0.22	5.6-7.3	Low	Moderate	Moderate	0.37		
Wellston part	0-6	0.6-2.0	0.18-0.22	5.1-6.5	Low	Moderate	Moderate	0.37	4	6
	6-40	0.6-2.0	0.17-0.21	4.5-6.0	Low	Moderate	High	0.37		
	40-50	0.6-2.0	0.12-0.17	4.5-6.0	Low	Moderate	High	0.37		
	50	---	---	---	-------	-------	-------	---		
Ava:										
[1]929C3:										
Ava part	0-7	0.2-0.6	0.20-0.22	3.6-5.5	Moderate	Moderate	High	0.43	3	7
	7-27	0.2-0.6	0.18-0.20	3.6-5.5	Moderate	Moderate	High	0.43		
	27-60	<0.06	0.09-0.10	3.6-5.5	Moderate	Moderate	High	0.43		
Hickory part	0-8	0.6-2.0	0.20-0.22	4.5-6.0	Low	Low	High	0.32	4	6
	8-47	0.6-2.0	0.15-0.19	5.1-5.5	Moderate	Moderate	Moderate	0.32		
	47-60	0.6-2.0	0.11-0.19	5.1-8.4	Low	Low	Low	0.32		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors		Wind erodibility group
						Uncoated steel	Concrete	K	T	
	In	In/hr	In/in	pH						
Hickory:										
[1]929D2:										
Hickory part-----	0-8	0.6-2.0	0.20-0.22	4.5-6.0	Low---------	Low-------	High------	0.32	5	6
	8-47	0.6-2.0	0.15-0.19	5.1-5.5	Moderate	Moderate	Moderate	0.32		
	47-60	0.6-2.0	0.11-0.19	5.1-8.4	Low---------	Low-------	Low-------	0.32		
Ava part---------	0-7	0.2-0.6	0.22-0.24	3.6-5.5	Moderate	Moderate	High------	0.43	4	6
	7-27	0.2-0.6	0.18-0.20	3.6-5.5	Moderate	Moderate	High------	0.43		
	27-60	<0.06	0.09-0.10	3.6-5.5	Moderate	Moderate	High------	0.43		
Goss:										
[1]930G:										
Goss part--------	0-3	2.0-6.0	0.06-0.17	5.1-6.0	Low---------	Low-------	Moderate	0.24	2	7
	3-23	2.0-6.0	0.06-0.10	5.1-6.0	Low---------	Low-------	Moderate	0.24		
	23-60	0.6-2.0	0.04-0.09	5.1-6.0	Moderate	Low-------	Moderate	0.24		
Alford part------	0-8	0.6-2.0	0.22-0.24	5.1-7.3	Low---------	Moderate	Moderate	0.37	5	5
	8-52	0.6-2.0	0.18-0.20	4.5-6.5	Moderate	Moderate	Moderate	0.37		
	52-60	0.6-2.0	0.20-0.22	5.6-7.3	Low---------	Moderate	Moderate	0.37		
Neotoma:										
[1]976G---------------	0-20	0.6-6.0	0.14-0.20	5.6-6.5	Low---------	Low-------	Moderate	0.20	3	8
	20-30	0.6-6.0	0.10-0.16	5.1-6.5	Low---------	Low-------	Moderate	0.20		
	30-48	2.0-6.0	0.05-0.09	5.1-6.5	Low---------	Low-------	Moderate	0.20		
	48	---	---	---	-----------	----------	----------	---		
[1]977E:										
Neotoma part-----	0-20	0.6-6.0	0.14-0.20	5.6-6.5	Low---------	Low-------	Moderate	0.20	3	8
	20-30	0.6-6.0	0.10-0.16	5.1-6.5	Low---------	Low-------	Moderate	0.20		
	30-48	2.0-6.0	0.05-0.09	5.1-6.5	Low---------	Low-------	Moderate	0.20		
	48	---	---	---	-----------	----------	----------	---		
Wellston part----	0-6	0.6-2.0	0.18-0.22	5.1-6.5	Low---------	Moderate	Moderate	0.37	4	6
	6-29	0.6-2.0	0.17-0.21	4.5-6.0	Low---------	Moderate	High------	0.37		
	29-50	0.6-2.0	0.12-0.17	4.5-6.0	Low---------	Moderate	High------	0.37		
	50	---	---	---	-----------	----------	----------	---		
[1]977G:										
Neotoma part-----	0-20	0.6-6.0	0.14-0.20	5.6-6.5	Low---------	Low-------	Moderate	0.20	3	8
	20-30	0.6-6.0	0.10-0.16	5.1-6.5	Low---------	Low-------	Moderate	0.20		
	30-48	2.0-6.0	0.05-0.09	5.1-6.5	Low---------	Low-------	Moderate	0.20		
	48	---	---	---	-----------	----------	----------	---		
Wellston part----	0-6	0.6-2.0	0.18-0.22	5.1-6.5	Low---------	Moderate	Moderate	0.37	4	6
	6-29	0.6-2.0	0.17-0.21	4.5-6.0	Low---------	Moderate	High------	0.37		
	29-50	0.6-2.0	0.12-0.17	4.5-6.0	Low---------	Moderate	High------	0.37		
	50	---	---	---	-----------	----------	----------	---		
Alford:										
[1]999D:										
Alford part------	0-8	0.6-2.0	0.22-0.24	5.1-7.3	Low---------	Moderate	Moderate	0.37	5	5
	8-52	0.6-2.0	0.18-0.20	4.5-6.5	Moderate	Moderate	Moderate	0.37		
	52-60	0.6-2.0	0.20-0.22	5.6-7.3	Low---------	Moderate	Moderate	0.37		
Hickory part-----	0-8	0.6-2.0	0.20-0.22	4.5-6.0	Low---------	Low-------	High------	0.32	5	6
	8-47	0.6-2.0	0.15-0.19	5.1-5.5	Moderate	Moderate	Moderate	0.32		
	47-60	0.6-2.0	0.11-0.19	5.1-8.4	Low---------	Low-------	Low-------	0.32		
[1]999D3:										
Alford part------	0-8	0.6-2.0	0.22-0.24	5.1-7.3	Low---------	Moderate	Moderate	0.37	4	5
	8-52	0.6-2.0	0.18-0.20	4.5-6.5	Moderate	Moderate	Moderate	0.37		
	52-60	0.6-2.0	0.20-0.22	5.6-7.3	Low---------	Moderate	Moderate	0.37		
Hickory part-----	0-8	0.6-2.0	0.20-0.22	4.5-6.0	Low---------	Low-------	High------	0.32	4	6
	8-47	0.6-2.0	0.15-0.19	5.1-5.5	Moderate	Moderate	Moderate	0.32		
	47-60	0.6-2.0	0.11-0.19	5.1-8.4	Low---------	Low-------	Low-------	0.32		
Hickory:										
[1]999E:										
Hickory part-----	0-8	0.6-2.0	0.20-0.22	4.5-6.0	Low---------	Low-------	High------	0.32	5	6
	8-47	0.6-2.0	0.15-0.19	5.1-5.5	Moderate	Moderate	Moderate	0.32		
	47-60	0.6-2.0	0.11-0.19	5.1-8.4	Low---------	Low-------	Low-------	0.32		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permea- bility	Available water capacity	Soil reaction	Shrink- swell potential	Risk of corrosion		Erosion factors		Wind erodi- bility group
						Uncoated steel	Concrete	K	T	
	In	In/hr	In/in	pH						
Hickory:										
Alford part-----	0-8	0.6-2.0	0.22-0.24	5.1-7.3	Low--------	Moderate	Moderate	0.37	4	5
	8-52	0.6-2.0	0.18-0.20	4.5-6.5	Moderate	Moderate	Moderate	0.37		
	52-60	0.6-2.0	0.20-0.22	5.6-7.3	Low--------	Moderate	Moderate	0.37		
[1]999E3:										
Hickory part----	0-8	0.6-2.0	0.20-0.22	4.5-6.0	Low--------	Low-------	High-----	0.32	4	6
	8-47	0.6-2.0	0.15-0.19	5.1-5.5	Moderate	Moderate	Moderate	0.32		
	47-60	0.6-2.0	0.11-0.19	5.1-8.4	Low--------	Low-------	Low-------	0.32		
Alford part-----	0-8	0.6-2.0	0.22-0.24	5.1-7.3	Low--------	Moderate	Moderate	0.37	4	5
	8-52	0.6-2.0	0.18-0.20	4.5-6.5	Moderate	Moderate	Moderate	0.37		
	52-60	0.6-2.0	0.20-0.22	5.6-7.3	Low--------	Moderate	Moderate	0.37		
Mine dump: M.D.										
Quarry: Qu.										

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior characteristics of the mapping unit.

TABLE 15.--SOIL AND WATER FEATURES

[The definitions of "flooding" and "water table" in the Glossary explain the terms "brief," "apparent," and "perched." The symbol > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					Ft			In		
Hoyleton: 3A, 3B2	C	None	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High.
Hickory: 8E, 8E3, 8G	C	None	---	---	>6.0	---	---	>60	---	Moderate.
Wynoose: 12	D	None	---	---	0-2.0	Apparent	Mar-Jun	>60	---	High.
Bluford: 13A, 13B	D	None	---	---	1.0-3.0	Perched	Mar-Jun	>60	---	High.
Ava: 14B, 14C3	C	None	---	---	2.0-4.0	Perched	Mar-Jun	>60	---	High.
Darwin: 71, 71+, F71, W71	D	Frequent	Long	Jan-Jun	0-2.0	Apparent	Jan-Jun	>60	---	Moderate.
Okaw: 84	D	Occasional	Brief	Apr-Jun	0-2.0	Apparent	Mar-Jun	>60	---	High.
Jacob: 85, W85	D	Frequent	Long	Mar-Jul	0-1.0	Perched	Feb-Jul	>60	---	Moderate.
Bonnie: 108	C/D	Frequent	Long	Mar-Jun	0-3.0	Apparent	Mar-Jun	>60	---	High.
Racoon: 109	C/D	Occasional	Brief	Mar-May	0-2.0	Apparent	Mar-Jun	>60	---	High.
Colp: 122A, 122B2, 122C2, 122C3, 122D	D	None	---	---	2.0-4.0	Apparent	Mar-Jun	>60	---	High.
Alvin: 131B, 131C3, 131E	B	None	---	---	>6.0	---	---	>60	---	Moderate.
Starks: 132	C	None	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High.
Camden: 134A, 134B2, 134C2, 134C3, 134D	B	---	---	---	>6.0	---	---	>60	---	High.
Gorham: 162	B/D	Frequent	Brief	Mar-Jun	0-3.0	Apparent	Mar-Jun	>60	---	High.
Stoy: 164A, 164B, 164C2	D	None	---	---	1.0-3.0	Perched	Feb-Apr	>60	---	High.
Weir: 165	D	Occasional	Brief	Mar-Jun	0-2.0	Perched	Feb-Jun	>60	---	High.
Dupo: 180	C	Frequent	Long	Jan-Jun	1.0-3.0	Apparent	Jan-Jun	>60	---	High.
Sexton: 208	C/D	Rare	---	---	0-2.0	Apparent	Mar-Jun	>60	---	High.
Hosmer: 214B, 214C2, 214C3, 214D2, 214D3	C	None	---	---	3.0-6.0	Perched	Mar-Apr	>60	---	High.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Potential frost action
					Ft			In		
St. Charles: 243B	B	None	---	---	>6.0	---	---	>60	---	High.
Alford: 308B2, 308C2, 308C3, 308D2, 308D3, 308E, 308E3, 308G	B	None	---	---	>6.0	---	---	>60	---	High.
Haymond: 331	B	Frequent	Brief	Jan-May	>6.0	---	---	>60	---	High.
Wakeland: 333	B/D	Frequent	Brief	Jan-May	1.0-3.0	Apparent	Jan-Apr	>60	---	High.
Birds: 334	C/D	Frequent	Long	Mar-Jun	0-3.0	Apparent	Mar-Jun	>60	---	High.
Hurst: 338A, 338B2	D	Rare	---	---	1.0-3.0	Apparent	Feb-Apr	>60	---	Moderate.
Belknap: 382	C	Common	Long	Mar-Jun	0-3.0	Apparent	Mar-Jun	>60	---	High.
Piopolis: 420, W420	C/D	Frequent	Long	Mar-Jun	0-3.0	Apparent	Mar-Jun	>60	---	High.
Karnak: 426	D	Frequent	Long	Mar-May	0-3.0	Apparent	Apr-Jun	>60	---	High.
Burnside: 427	B	Occasional	Brief	Mar-Jun	3.0-5.0	Apparent	Feb-Jun	29-65	Hard	Moderate.
Coffeen: 428	B	Frequent	Brief	Mar-May	1.0-3.0	Apparent	Jan-May	>60	---	High.
Raddle: 430A	B	Rare	---	---	>6.0	---	---	>60	---	High.
Ware: 456, F456	B	Common	Brief	Apr-Jun	4.0-6.0	Apparent	Apr-Jun	>60	---	Moderate.
Booker: 457, W457	D	Common	Brief to long.	Apr-Jul	0-1.0	Perched	Nov-May	>60	---	Moderate.
Urban land: 533.										
Bowdre: 589	C	Rare	---	---	1.5-2.0	Perched	Jan-Apr	>60	---	---
Cairo: 590	D	Common	Brief	Nov-Jun	0-2.0	Apparent	Nov-Jun	>60	---	Moderate.
Medway: 682, F682	B	Common	Brief	Nov-Jun	1.5-3.0	Apparent	Jan-Apr	>60	---	High.
Banlic: 787	C	Rare	---	---	1.0-3.0	Perched	Jan-Jun	>60	---	High.
Orthents, silty: 801	D	None	---	---	2.0-4.0	Apparent	Jan-Jun	>60	---	High.
Orthents, loamy: 802C, 802G	C	None	---	---	>6.0	---	---	>60	---	Moderate.
Orthents, clayey: 805	D	Frequent to rare.	Long	Jan-Jun	---	Apparent	Jan-Jun	>60	---	Moderate.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	
					Ft			In		
Hosmer:										
[1]850D:										
Hosmer part----	C	None---------	---	---	3.0-6.0	Perched	Mar-Apr	>60	---	High.
Hickory part---	C	None---------	---	---	>6.0	---	---	>60	---	Moderate.
[1]850D3:										
Hosmer part----	C	None---------	---	---	3.0-6.0	Perched	Mar-Apr	>60	---	High.
Hickory part---	C	None---------	---	---	>6.0	---	---	>60	---	Moderate.
Hickory:										
[1]850E:										
Hickory part---	C	None---------	---	---	>6.0	---	---	>60	---	Moderate.
Hosmer part----	C	None---------	---	---	3.0-6.0	Perched	Mar-Apr	>60	---	High.
[1]850E3:										
Hickory part---	C	None---------	---	---	>6.0	---	---	>60	---	Moderate.
Hosmer part----	C	None---------	---	---	3.0-6.0	Perched	Mar-Apr	>60	---	High.
Alford:										
[1]852E:										
Alford part----	B	None---------	---	---	>6.0	---	---	>60	---	High.
Wellston part--	B	None---------	---	---	>3.0	Apparent	Mar-May	>40	Hard	High.
[1]852G:										
Alford part----	B	None---------	---	---	>6.0	---	---	>60	---	High.
Wellston part--	B	None---------	---	---	>3.0	Apparent	Mar-May	>40	Hard	High.
Ava:										
[1]929C3:										
Ava part--------	C	None---------	---	---	2.0-4.0	Perched	Mar-Jun	>60	---	High.
Hickory part---	C	None---------	---	---	>6.0	---	---	>60	---	Moderate.
Hickory:										
[1]929D2:										
Hickory part---	C	None---------	---	---	>6.0	---	---	>60	---	Moderate.
Ava part--------	C	None---------	---	---	2.0-4.0	Perched	Mar-Jun	>60	---	High.
Goss:										
[1]930G:										
Goss part-------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate.
Alford part----	B	None---------	---	---	>6.0	---	---	>60	---	High.
Neotoma:										
[2]976G-------------	B	None---------	---	---	>6.0	---	---	40-80	Hard	Low.
[1]977E:										
Neotoma part---	B	None---------	---	---	>6.0	---	---	40-80	Hard	Low.
Wellston part--	B	None---------	---	---	>3.0	Apparent	Mar-May	>40	Hard	High.
[1]977G:										
Neotoma part---	B	None---------	---	---	>6.0	---	---	40-80	Hard	Low.
Wellston part--	B	None---------	---	---	>3.0	Apparent	Mar-May	>40	Hard	High.
Alford:										
[1]999D:										
Alford part----	B	None---------	---	---	>6.0	---	---	>60	---	High.
Hickory part---	C	None---------	---	---	>6.0	---	---	>60	---	Moderate.

See footnotes at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	
					Ft			In		
Alford:										
[1]999D3:										
Alford part	B	None	---	---	>6.0	---	---	>60	---	High.
Hickory part	C	None	---	---	>6.0	---	---	>60	---	Moderate.
Hickory:										
[1]999E:										
Hickory part	C	None	---	---	>6.0	---	---	>60	---	Moderate.
Alford part	B	None	---	---	>6.0	---	---	>60	---	High.
[1]999E3:										
Hickory part	C	None	---	---	>6.0	---	---	>60	---	Moderate.
Alford part	B	None	---	---	>6.0	---	---	>60	---	High.
Mine dump:										
M.D.										
Quarry:										
Qu.										

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior characteristics of the mapping unit.

[2]Rock outcrop part not evaluated.

TABLE 16.--ENGINEERING TEST DATA

[Tests performed by the Illinois Department of Transportation, Bureau of Materials according to standard pro
American Association of State Highway and Transportation Officials (AASHTO)]

Soil name and location	Parent material	Illinois report number S74-	Depth	Moisture density1/		Percentage passing sieve--2/			Percentage smaller than--2/			
				Maximum	Optimum	No. 10	No. 40	No. 200	0.05 mm	0.02 mm	0.005 mm	0.002 mm
			In	lb/cu ft	Pct							
Burnside silt loam: Approximately 2,510 feet north and 1,056 feet west of the SE corner of sec. 24, T. 10 S., R. 1 W. (Modal.)	Thin silty alluvium over stony alluvium.	39-11-1	18-24	126.9	10.6	41.1	29.2	19.5	14.3	7.8	4.1	3.0
		39-11-2	24-60	127.9	10.0	31.0	19.9	10.0	8.3	6.2	4.0	3.1
Cairo silty clay: Approximately 453 feet north and 612 feet west of the SE corner of sec. 26, T. 9 S., R. 4 W. Non-contrasting substratum	Clayey over loamy alluvium.	39-8-1	0-8	92.7	24.1	100.0	999.0	98.4	93.6	77.6	47.0	40.8
		39-8-2	16-27	94.7	25.1	100.0	999.0	97.4	92.3	80.0	54.2	42.7
		39-8-3	36-40	107.5	17.7	100.0	999.0	45.3	31.5	22.8	18.2	16.4
		39-8-4	45-60	102.6	17.1	100.0	999.0	23.5	13.7	10.8	8.2	6.1
Colp silt loam: Approximately 1,500 feet north and 2,600 feet west of the SE corner of sec. 34, T. 7 S., R. 1 W. (Modal.)	Thin loess over clayey lacustrine deposits.	39-1-1	0-9	106.4	17.8	100.0	97.3	94.8	86.2	55.5	17.0	12.6
		39-1-2	19-32	97.7	23.0	100.0	99.6	98.4	94.9	79.7	56.6	49.2
		39-1-3	39-52	99.6	19.6	100.0	99.8	98.2	84.8	67.0	48.6	41.4
Gorham silty clay loam: Approximately 1,881 feet north and 1,617 feet east of the SW corner of sec. 24 in T. 9 S., R. 4 W. (Modal.)	Alluvium	39-7-1	0-6	103.6	18.5	100.0	99.4	83.4	75.0	98.7	42.2	32.3
		39-7-2	13-26	95.8	21.8	100.0	99.8	80.8	72.5	56.7	41.0	34.1
		39-7-3	39-46	105.6	18.4	100.0	99.9	27.0	23.6	19.7	18.1	15.5
Hurst silt loam: Approximately 656 feet north and 2,340 feet west of the SE corner of sec. 29, T. 7 S., R. 2 W. (Thick solum)	Thin loess over clayey lacustrine deposits.	39-2-1	10-17	110.2	16.2	100.0	97.3	94.8	87.8	57.3	26.6	19.6
		39-2-2	24-34	97.1	22.9	100.0	99.6	98A	92.8	73.8	50.6	42.7
		39-2-3	61-65	102.9	19.3	100.0	99.8	98.2	81.8	58.2	40.6	35.0

See footnotes at end of table.

TABLE 16.--ENGINEERING TEST DATA--Continued

Soil name and location	Parent material	Illinois report number S74-	Depth	Moisture density1/ Maximum	Moisture density1/ Optimum	Percentage passing sieve--2/ No. 10	Percentage passing sieve--2/ No. 40	Percentage passing sieve--2/ No. 200	Percentage smaller than--2/ 0.05 mm	Percentage smaller than--2/ 0.02 mm	Percentage smaller than--2/ 0.005 mm	Percentage smaller than--2/ 0.002 mm	Liquid
			In	lb/cu ft	Pct								Pc
Jacob clay: Approximately 50 feet north and 1,600 feet east of the SW corner of sec. 22, T. 10 S., R. 3 W. (Modal.)	Clayey alluvium.	39-5-1	4-16	83.7	32.4	100.0	99.2	98.0	91.7	92.2	84.6	75.0	85
Okaw silt loam: Approximately 624 feet west and 105 feet north of the SE corner of sec. 8, T. 7 S., R. 2 W. (Modal.)	Thin loess over clayey lacustrine deposits.	39-6-1	7-11	107.3	17.0	100.0	96.1	93.3	84.6	63.8	27.0	17.4	30
		39-6-2	15-31	88.5	28.2	100.0	99.8	99.1	92.7	77.5	51.0	44.5	60
		39-6-3	54-63	95.8	23.6	100.0	98.9	96.3	91.5	80.2	56.2	47.8	54
St. Charles silt loam: Approximately 525 feet south and 90 feet west of center of sec. 2, T. 8 S., R. 2 W. Thick subsoil phase.	Loess over silty lacustrine deposits.	39-3-1	13-19	99.3	16.7	100.0	99.7	98.5	91.4	71.0	42.2	32.9	49
		39-3-2	26-35	100.7	21.7	100.0	99.3	98.2	85.9	61.4	40.2	33.9	55
		39-3-3	55-67	96.4	24.1	100.0	99.8	98.2	92.6	71.8	50.6	41.2	61
Wynoose silt loam: Approximately 1,371 feet south and 42 feet east of the NW corner of sec. 11, T. 7 S., R. 2 W. Thick loess phase.	Loess over glacial drift.	39-4-1	5-10	105.4	19.0	100.0	99.0	98.1	95.0	73.5	30.6	21.6	3[illegible]
		39-4-2	19-32	98.6	21.5	100.0	99.7	99.2	92.7	73.4	48.6	41.3	48
		39-4-3	58-80	102.8	20.4	100.0	98.6	96.2	89.0	57.2	30.2	24.9	45

1/Based as AASHTO Designation T99-57, Method A (1).

2/Mechanical analysis according to AASHTO Designation T88-57 (1). Results by this procedure frequently d from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are ca basis of all the material including that coarser than 2 millimeters in diameter. In the SCS soil survey proce material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is exclude grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural

3/Based on AASHTO Designation M145-49 (1).

4/Based on the Unified Soil Classification System (8).

5/NP = Nonplastic.

TABLE 17.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics of this taxadjunct that are outside the range of the series]

Soil name	Family or higher taxonomic class
Alford	Fine-silty, mixed, mesic Typic Hapludalfs
Alvin	Coarse-loamy, mixed, mesic Typic Hapludalfs
Ava	Fine-silty, mixed, mesic Typic Fragiudalfs
Banlic	Coarse-silty, mixed, nonacid, mesic Aeric Haplaquepts
Belknap	Coarse-silty, mixed, acid, mesic Aeric Fluvaquents
Birds	Fine-silty, mixed, nonacid, mesic Typic Fluvaquents
Bluford	Fine, montmorillonitic, mesic Aquic Hapludalfs
Bonnie	Fine-silty, mixed, acid, mesic Typic Fluvaquents
Booker	Very-fine, montmorillonitic, mesic Vertic Haplaquolls
Bowdre	Clayey over loamy, montmorillonitic, thermic Fluvaquentic Hapludolls
Burnside	Loamy-skeletal, mixed, acid, mesic Typic Udifluvents
*Cairo	Clayey over sandy or sandy-skeletal, montmorillonitic, thermic Vertic Haplaquolls
Camden	Fine-silty, mixed, mesic Typic Hapludalfs
Coffeen	Coarse-silty, mixed, mesic Fluvaquentic Hapludolls
Colp	Fine, montmorillonitic, mesic Aquic Hapludalfs
Darwin	Fine, montmorillonitic, mesic Vertic Haplaquolls
Dupo	Coarse-silty over clayey, mixed, nonacid, mesic Aquic Udifluvents
Gorham	Fine-silty, mixed, mesic Fluvaquentic Haplaquolls
Goss	Clayey-skeletal, mixed, mesic Typic Paleudalfs
Haymond	Coarse-silty, mixed, nonacid, mesic Typic Udifluvents
Hickory	Fine-loamy, mixed, mesic Typic Hapludalfs
Hosmer	Fine-silty, mixed, mesic Typic Fragiudalfs
Hoyleton	Fine, montmorillonitic, mesic Aquollic Hapludalfs
Hurst	Fine, montmorillonitic, mesic Aeric Ochraqualfs
Jacob	Very fine, montmorillonitic, acid, mesic Vertic Haplaquepts
Karnak	Fine, montmorillonitic, nonacid, mesic Vertic Haplaquepts
Medway	Fine-loamy, mixed, mesic Fluvaquentic Hapludolls
Neotoma	Loamy-skeletal, mixed, mesic Ultic Hapludalfs
Okaw	Fine, montmorillonitic, mesic Typic Albaqualfs
Orthents, silty	Fine-silty, mixed, mesic Udorthents
Orthents, loamy	Fine-loamy, mixed, mesic Udorthents
Orthents, clayey	Clayey, montmorillonitic, mesic Udorthents
Piopolis	Fine-silty, mixed, acid, mesic Typic Fluvaquents
Racoon	Fine-silty, mixed, mesic Typic Ochraqualfs
Raddle	Fine-silty, mixed, mesic Typic Hapludolls
*St. Charles	Fine-silty, mixed, mesic Typic Hapludalfs
Sexton	Fine, montmorillonitic, mesic Typic Ochraqualfs
Starks	Fine-silty, mixed, mesic Aeric Ochraqualfs
Stoy	Fine-silty, mixed, mesic Aquic Hapludalfs
Wakeland	Coarse-silty, mixed, nonacid, mesic Aeric Fluvaquents
Ware	Coarse-loamy, mixed, thermic Fluventic Hapludolls
Weir	Fine, montmorillonitic, mesic Typic Ochraqualfs
Wellston	Fine-silty, mixed, mesic Ultic Hapludalfs
Wynoose	Fine, montmorillonitic, mesic Typic Albaqualfs

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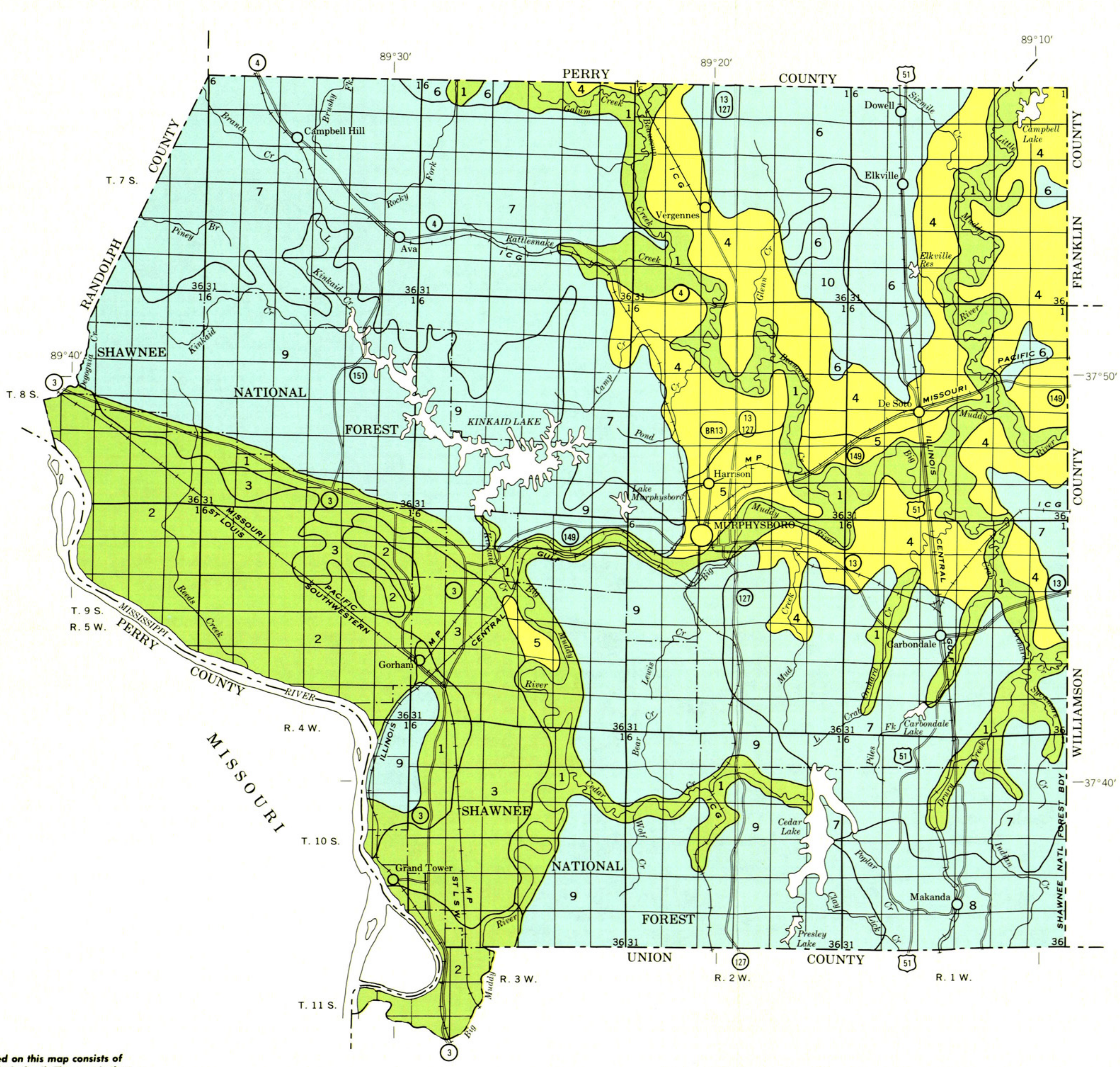


U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FOREST SERVICE
ILLINOIS AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP
JACKSON COUNTY, ILLINOIS

Scale 1 : 190,080

1 0 1 2 3 4 Miles

SOIL ASSOCIATIONS

DOMINANTLY NEARLY LEVEL TO GENTLY SLOPING SOILS THAT FORMED IN ALLUVIUM ON FLOOD PLAINS

1 Belknap-Wakeland association: Somewhat poorly drained soils that formed in water-laid silty sediment on tributary flood plains

2 Darwin-Medway-Cairo association: Very poorly drained to somewhat poorly drained soils that formed in water-laid clayey or loamy sediment on the flood plain of the Mississippi River

3 Jacob-Booker association: Very poorly drained and poorly drained soils that formed in water-laid, acid clayey sediment on the flood plain of the Mississippi River

DOMINANTLY NEARLY LEVEL TO MODERATELY STEEP SOILS THAT FORMED IN WATER-LAID SEDIMENT ON TERRACES

4 Hurst-Colp-St. Charles association: Somewhat poorly drained to well drained soils that formed in silty over clayey sediment or in silty sediment on terraces

5 Alvin-Camden association: Well drained and moderately well drained soils that formed in sandy and silty sediment over loamy sediment on terraces

DOMINANTLY NEARLY LEVEL TO VERY STEEP SOILS THAT FORMED IN LOESS, GLACIAL DRIFT, AND MATERIAL THAT WEATHERED FROM BEDROCK ON UPLANDS

6 Bluford-Ava-Wynoose association: Moderately well drained to poorly drained soils that formed in loess or loess and loamy material on uplands

7 Hosmer association: Moderately well drained soils that formed in loess on uplands

8 Hosmer-Wellston association: Moderately well drained and well drained soils that formed in loess or loess and material that weathered from bedrock on uplands

9 Alford-Wellston association: Well drained soils that formed in loess or loess and material that weathered from bedrock on uplands

10 Orthents association: Well drained soils that formed in loamy material on strip-mine spoil banks

Compiled 1976

SECTIONALIZED TOWNSHIP

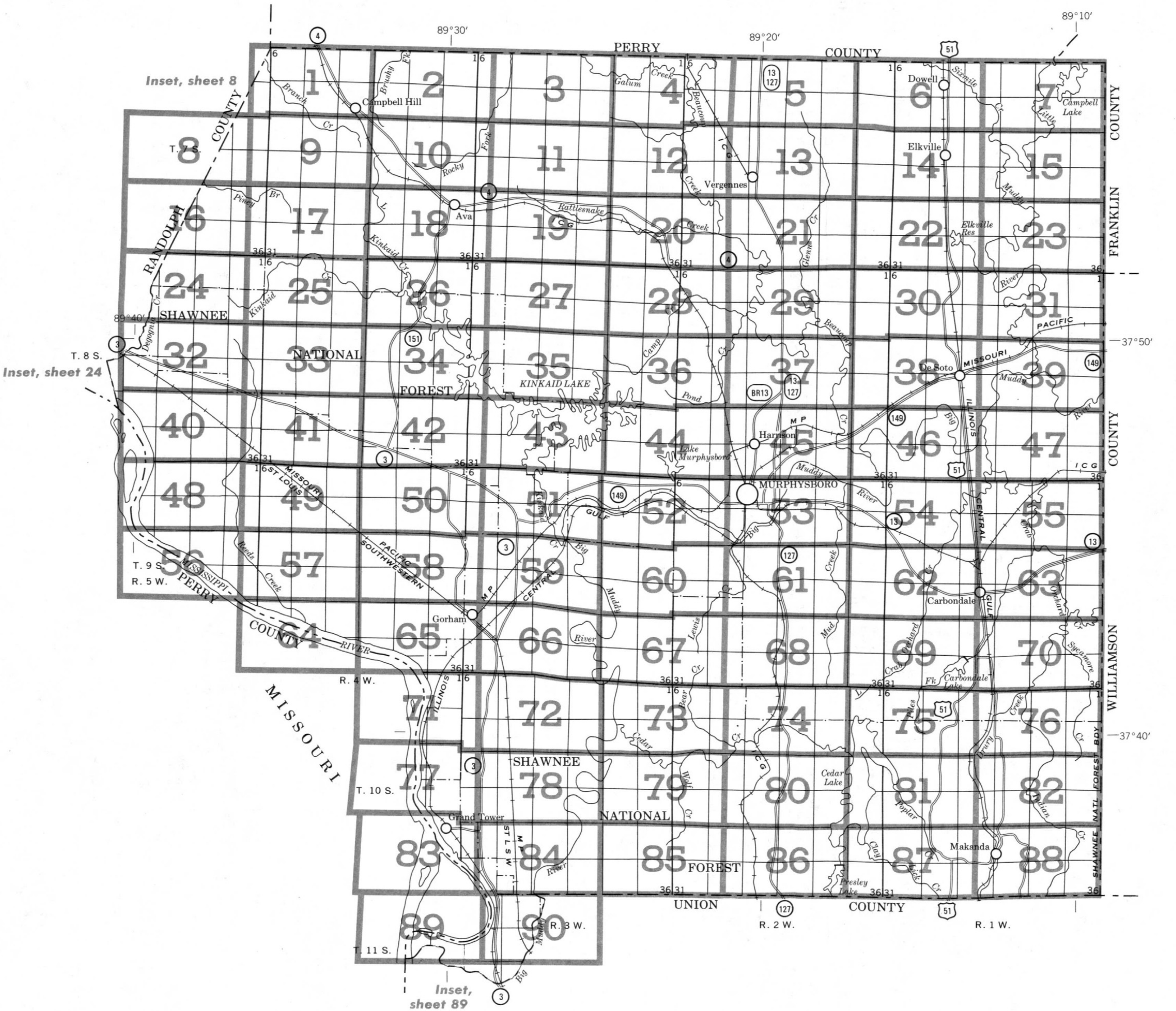
6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

INDEX TO MAP SHEETS
JACKSON COUNTY, ILLINOIS

Scale 1:190,080

1 0 1 2 3 4 Miles



SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool — Davis Airstrip; FLOOD POOL LINE

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEMS & DESIGNATIONS

- Interstate — 79
- Federal — 410
- State — 52
- County, farm or ranch — 378

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small — water; w

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — GAS
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — water; w
- Intermittent — int; i

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — 84; 134C2

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown) — S

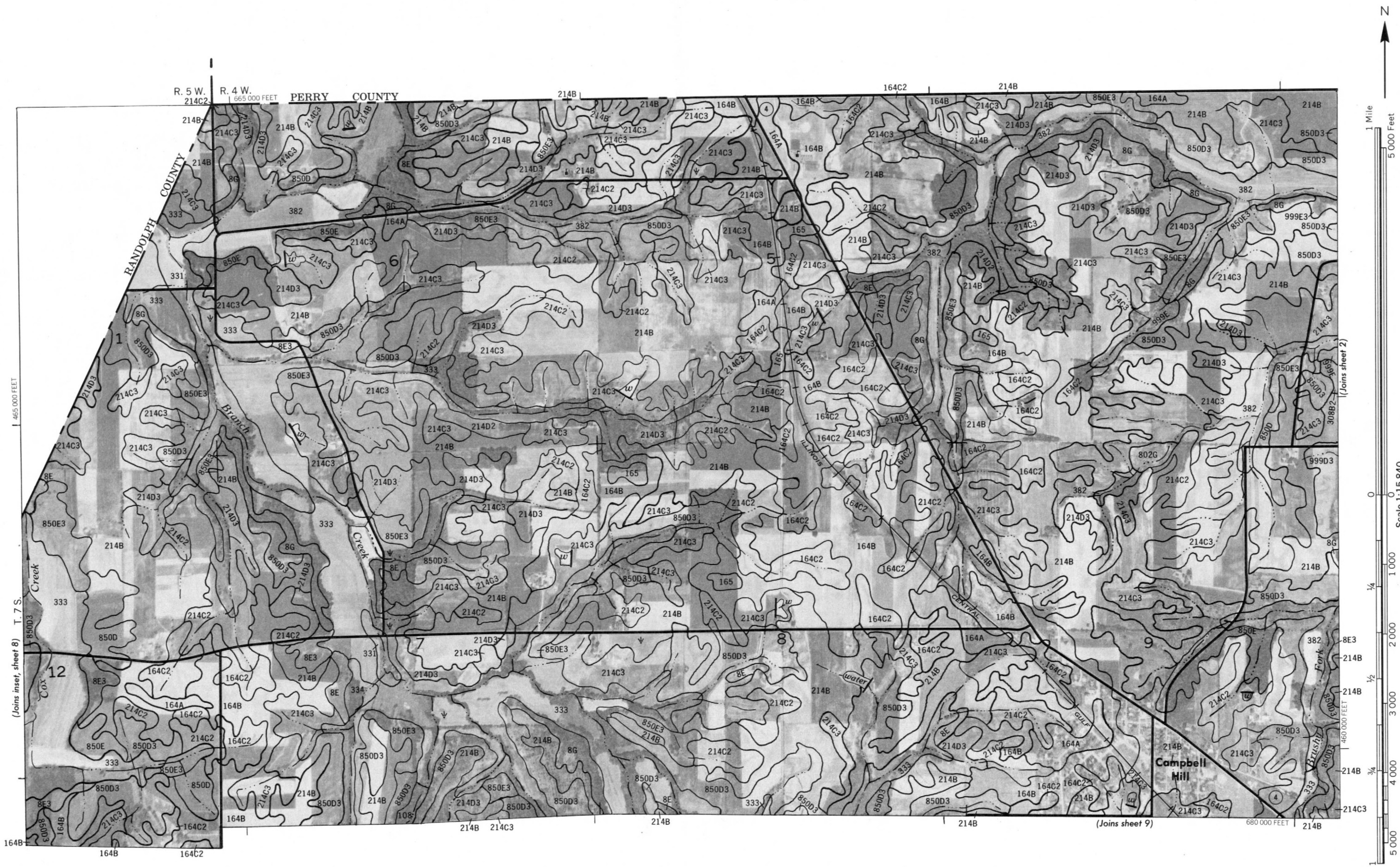
MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot
- Mine sink
- Sewage lagoon — S.L.
- Quarry — Qu.
- Mine dump — M.D.

SOIL LEGEND

Numerical symbols alone or preceding a capital letter represent the soils or miscellaneous areas. The capital letter A, B, C, etc. indicates the slope. Symbols without a slope letter indicate the soil is level or nearly level. A final number of 2 or 3 in the symbol indicates that the soil is eroded or severely eroded. The capital letters "F" or "W" preceding the number or a "+" following a number indicate other phases.

SYMBOL	NAME
3A	Hoyleton silt loam, 0 to 3 percent slopes
3B2	Hoyleton silt loam, 3 to 6 percent slopes, eroded
8E	Hickory silt loam, 18 to 30 percent slopes
8E3	Hickory soils, 15 to 30 percent slopes, severely eroded
8G	Hickory silt loam, 30 to 50 percent slopes
12	Wynoose silt loam
13A	Bluford silt loam, 0 to 2 percent slopes
13B	Bluford silt loam, 2 to 4 percent slopes
14B	Ava silt loam, 2 to 6 percent slopes
14C3	Ava silty clay loam, 6 to 12 percent slopes, severely eroded
71	Darwin silty clay
71+	Darwin silt loam
F71	Darwin silty clay, frequently flooded
W71	Darwin silty clay, wet
84	Okaw silt loam
85	Jacob clay
W85	Jacob clay, wet
108	Bonnie silt loam
109	Racoon silt loam
122A	Colp silt loam, 0 to 3 percent slopes
122B2	Colp silt loam, 3 to 7 percent slopes, eroded
122C2	Colp silt loam, 7 to 12 percent slopes, eroded
122C3	Colp silty clay loam, 7 to 15 percent slopes, severely eroded
122D	Colp silt loam, 12 to 20 percent slopes
131B	Alvin very fine sandy loam, 1 to 7 percent slopes
131C3	Alvin loam, 7 to 15 percent slopes, severely eroded
131E	Alvin very fine sandy loam, 12 to 25 percent slopes
132	Starks silt loam
134A	Camden silt loam, 0 to 3 percent slopes
134B2	Camden silt loam, 3 to 7 percent slopes, eroded
134C2	Camden silt loam, 7 to 12 percent slopes, eroded
134C3	Camden silty clay loam, 7 to 15 percent slopes, severely eroded
134D	Camden silt loam, 12 to 18 percent slopes
162	Gorham silty clay loam
164A	Stoy silt loam, 0 to 2 percent slopes
164B	Stoy silt loam, 2 to 4 percent slopes
164C2	Stoy silt loam, 4 to 7 percent slopes, eroded
165	Weir silt loam
180	Dupo silt loam
208	Sexton silt loam
214B	Hosmer silt loam, 2 to 7 percent slopes
214C2	Hosmer silt loam, 7 to 12 percent slopes, eroded
214C3	Hosmer silty clay loam, 7 to 12 percent slopes, severely eroded
214D2	Hosmer silt loam, 12 to 18 percent slopes, eroded
214D3	Hosmer silty clay loam, 12 to 18 percent slopes, severely eroded
243B	St. Charles silt loam, 2 to 7 percent slopes
308B2	Alford silt loam, 2 to 6 percent slopes, eroded
308C2	Alford silt loam, 6 to 12 percent slopes, eroded
308C3	Alford silty clay loam, 6 to 12 percent slopes, severely eroded
308D2	Alford silt loam, 12 to 18 percent slopes, eroded
308D3	Alford silty clay loam, 12 to 18 percent slopes, severely eroded
308E3	Alford silty clay loam, 18 to 30 percent slopes, severely eroded
308E	Alford silt loam, 18 to 30 percent slopes
308G	Alford silt loam, 30 to 50 percent slopes
331	Haymond silt loam
333	Wakeland silt loam
334	Birds silt loam
338A	Hurst silt loam, 0 to 2 percent slopes
338B2	Hurst silt loam, 2 to 6 percent slopes, eroded
382	Belknap silt loam
420	Piopolis silty clay loam
W420	Piopolis silty clay loam, wet
426	Karnak silty clay
427	Burnside silt loam
428	Coffeen silt loam
430A	Raddle silt loam
456	Ware loam
F456	Ware sandy loam, frequently flooded
457	Booker silty clay
W457	Booker silty clay, wet
533	Urban land
589	Bowdre silty clay
590	Cairo silty clay
682	Medway silty clay loam
F682	Medway soils, frequently flooded
787	Banlic silt loam
801	Orthents, silty, sloping
802C	Orthents, loamy, hilly
802G	Orthents, loamy, very steep
805	Orthents, clayey, sloping
850D	Hosmer–Hickory silt loams, 12 to 18 percent slopes
850D3	Hosmer–Hickory complex, 12 to 18 percent slopes, severely eroded
850E	Hickory–Hosmer silt loams, 18 to 30 percent slopes
850E3	Hickory–Hosmer complex, 18 to 30 percent slopes, severely eroded
852E	Alford–Wellston silt loams, 15 to 30 percent slopes
852G	Alford–Wellston silt loams, 30 to 50 percent slopes
929C3	Ava–Hickory complex, 7 to 12 percent slopes, severely eroded
929D2	Hickory–Ava silt loams, 12 to 18 percent slopes, eroded
930G	Goss–Alford complex, 25 to 65 percent slopes
976G	Neotoma–Rock outcrop complex, 25 to 55 percent slopes
977E	Neotoma–Wellston complex, 18 to 30 percent slopes
977G	Neotoma–Wellston complex, 30 to 50 percent slopes
999D	Alford–Hickory silt loams, 12 to 18 percent slopes
999D3	Alford–Hickory complex, 12 to 18 percent slopes, severely eroded
999E	Hickory–Alford silt loams, 18 to 30 percent slopes
999E3	Hickory–Alford complex, 18 to 30 percent slopes, severely eroded



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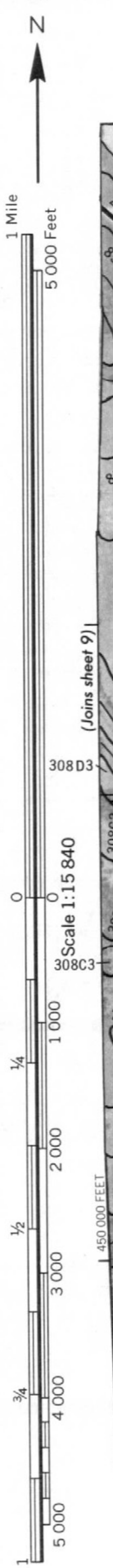

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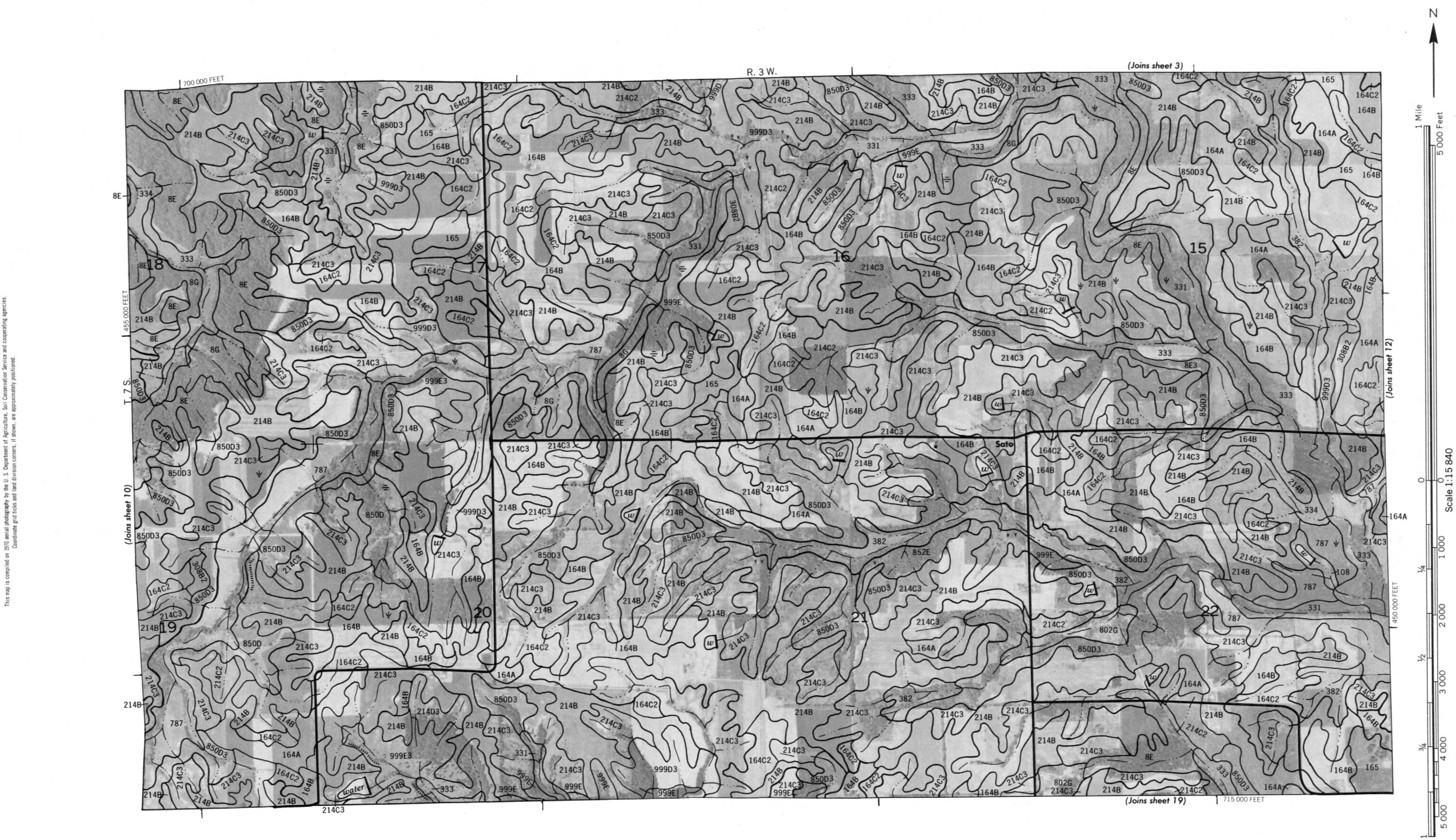
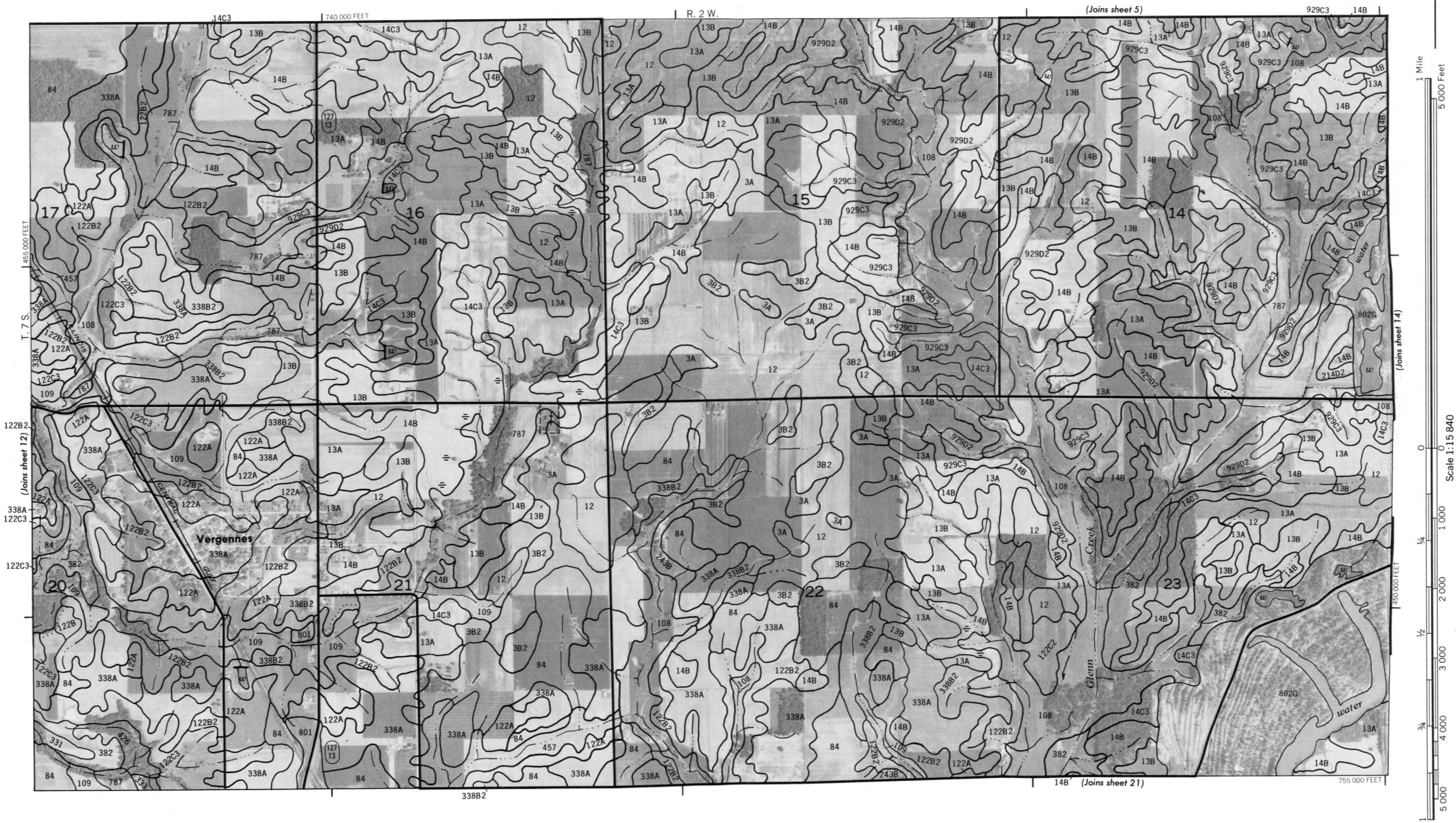
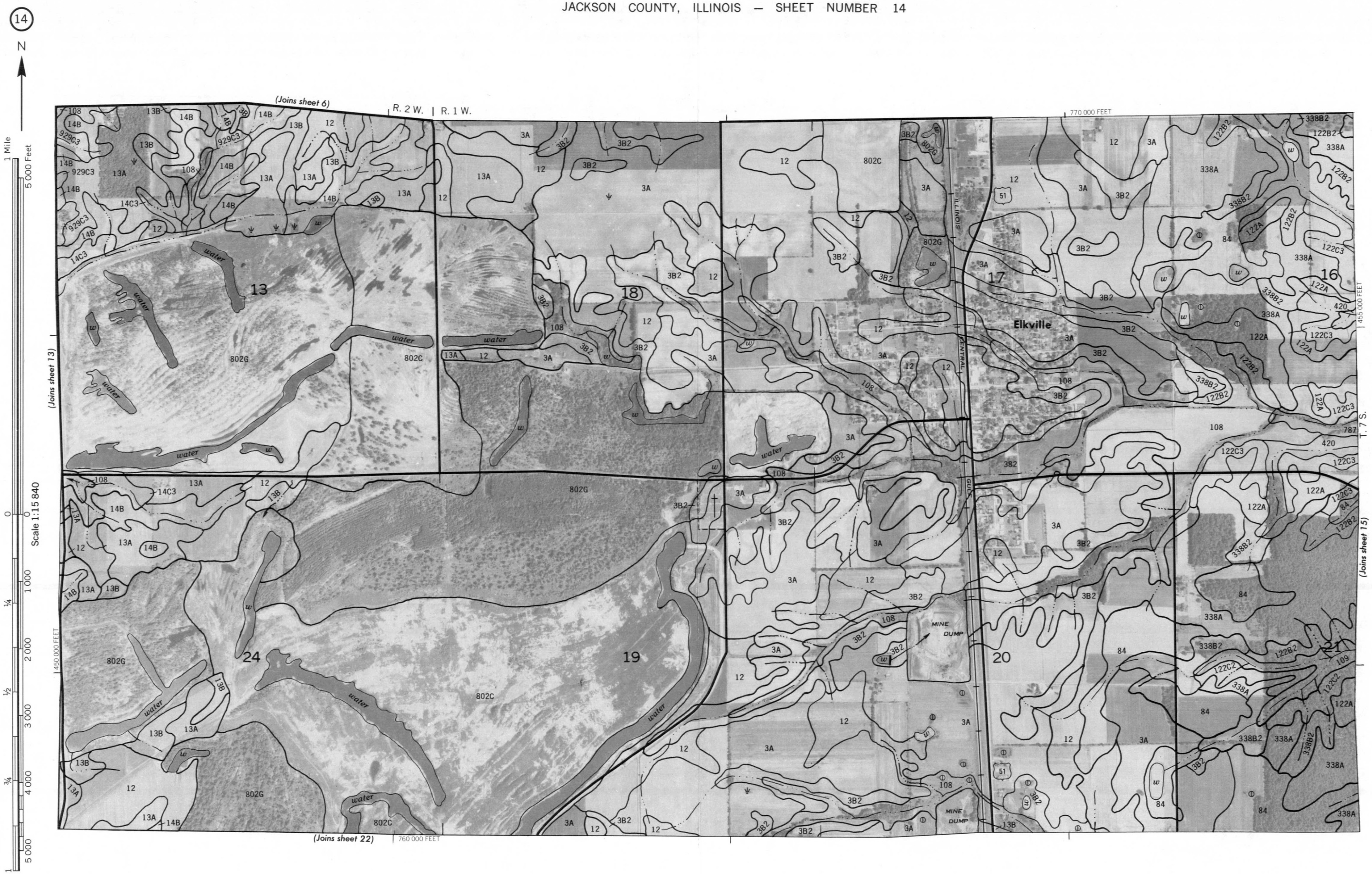

N
(Joins sheet 3)
R. 3 W.
700 000 FEET
455 000 FEET
450 000 FEET
715 000 FEET
T. 7 S.
(Joins sheet 10)
(Joins sheet 12)
(Joins sheet 19)
Sato
water
15
16
17
18
19
20
21
22
1 Mile
5 000 Feet
Scale 1:15 840
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

JACKSON COUNTY, ILLINOIS — SHEET NUMBER 12

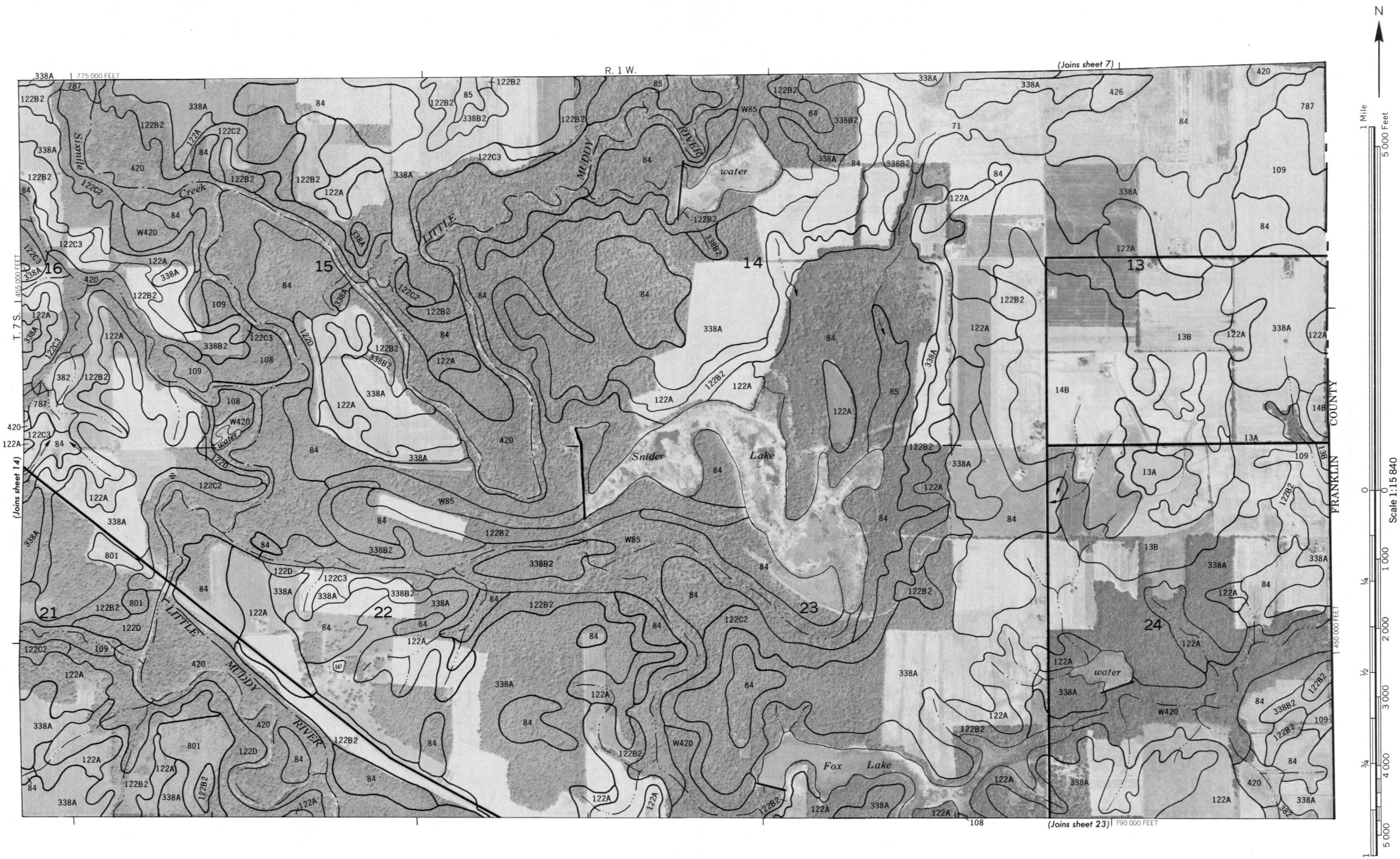
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



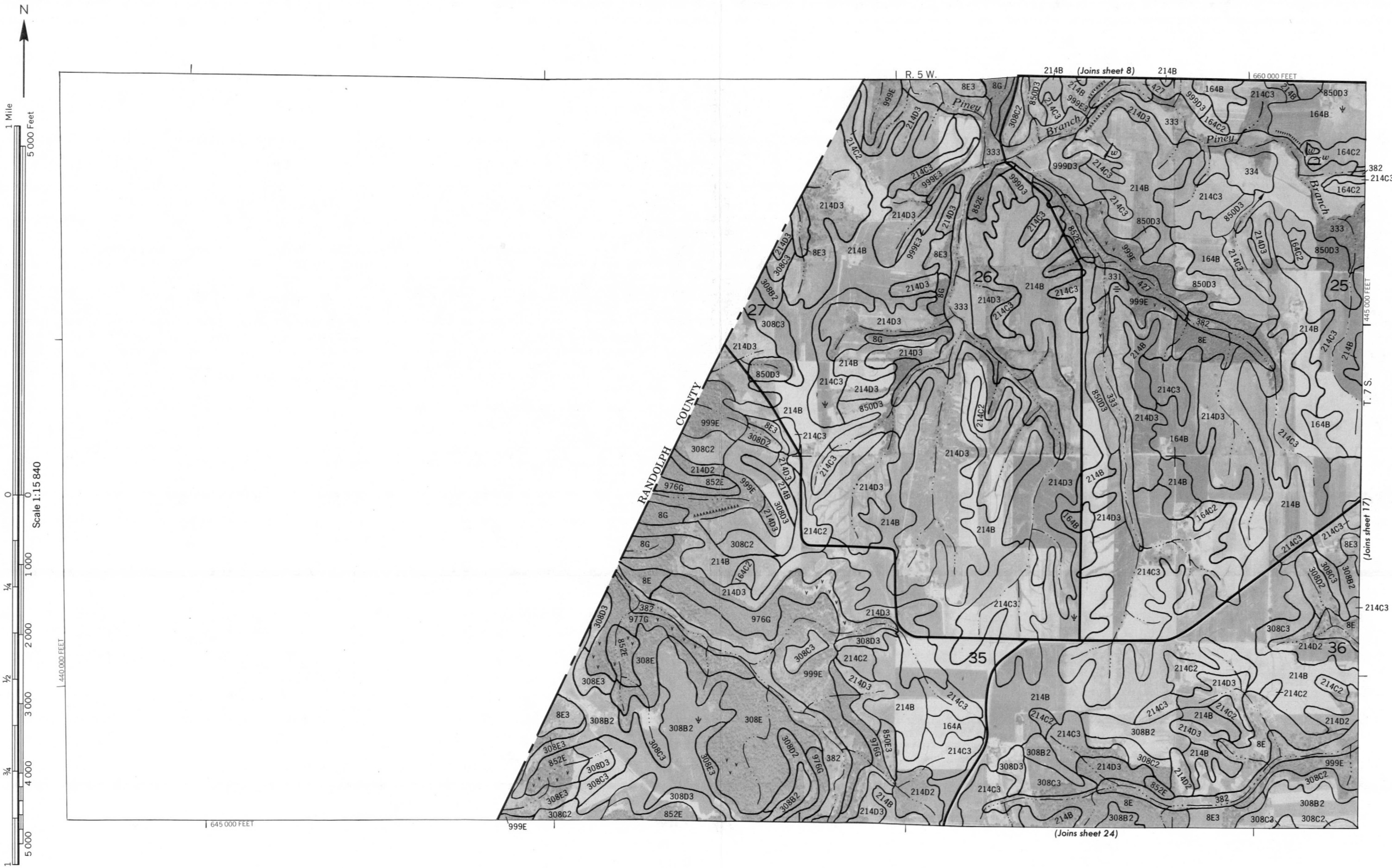
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



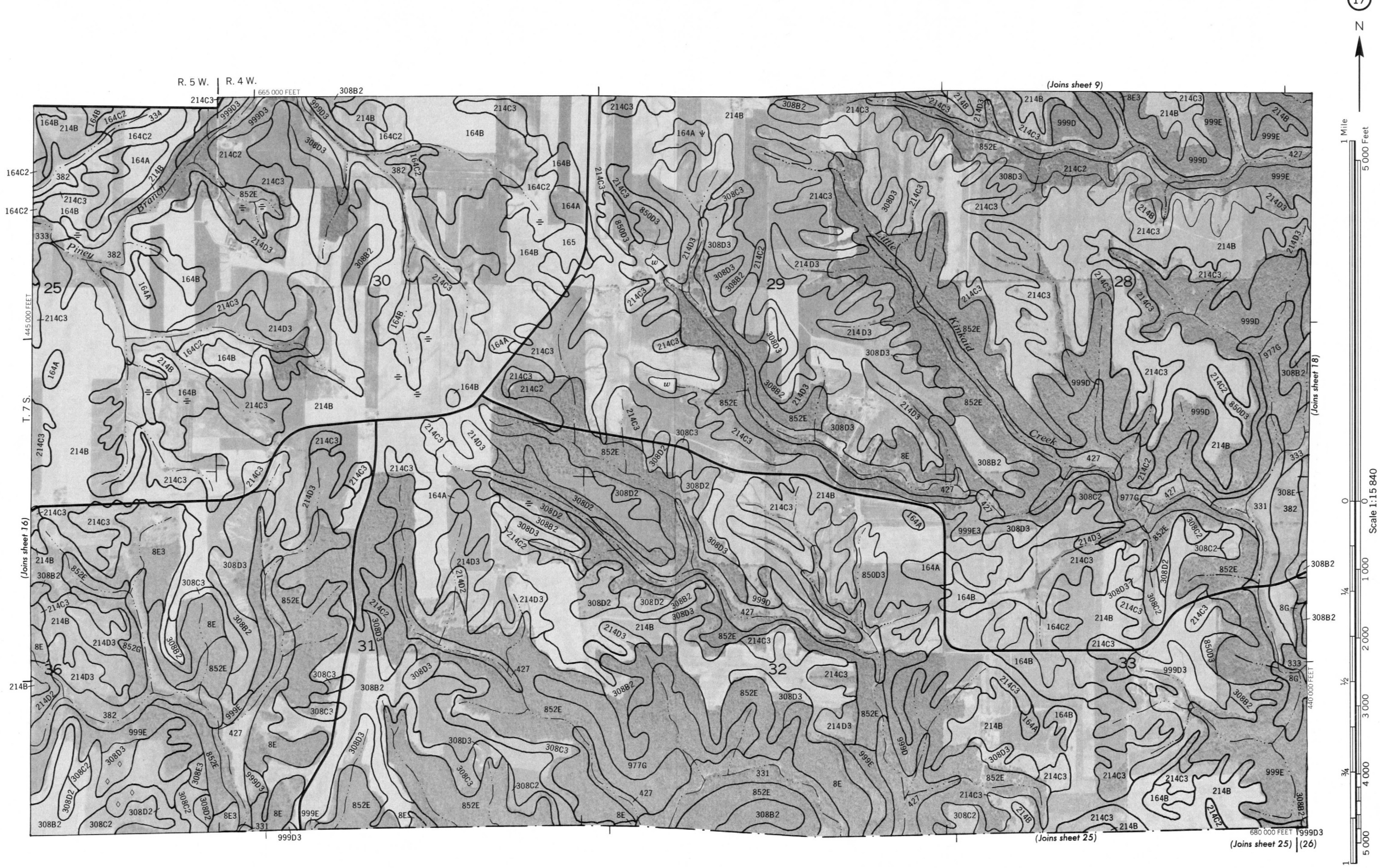
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



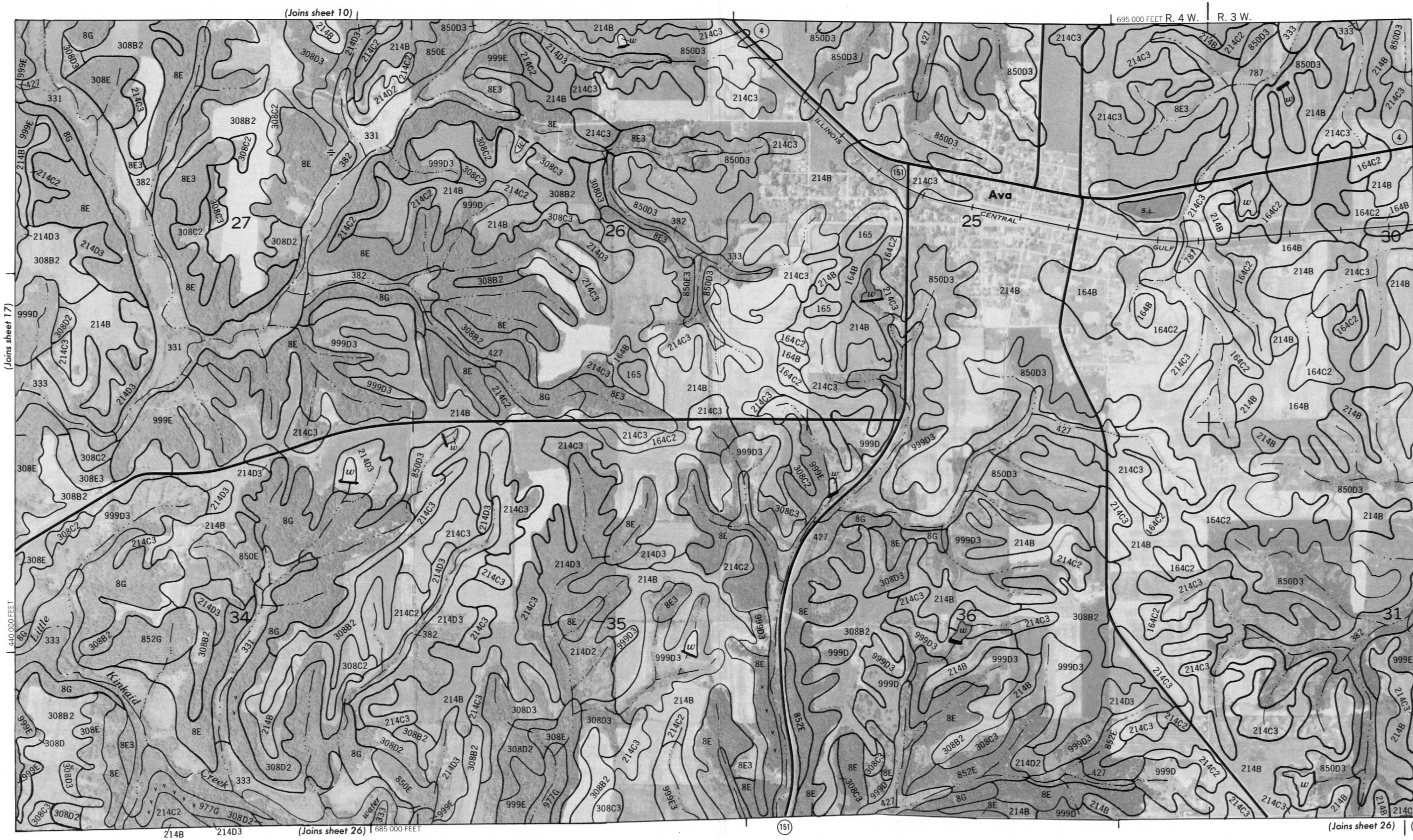
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

18

N



1 Mile
5 000 Feet
Scale 1:15 840
0
¼
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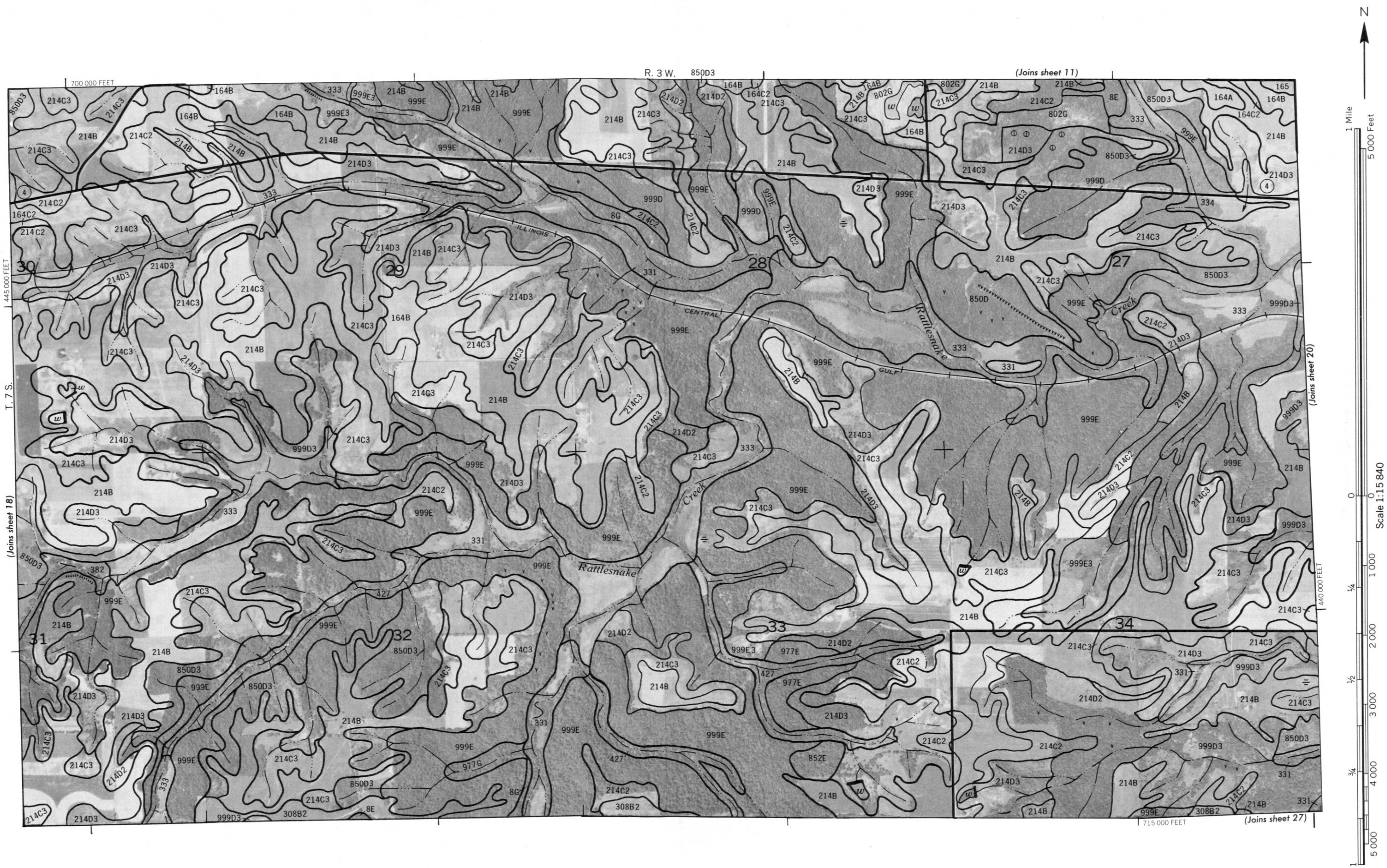
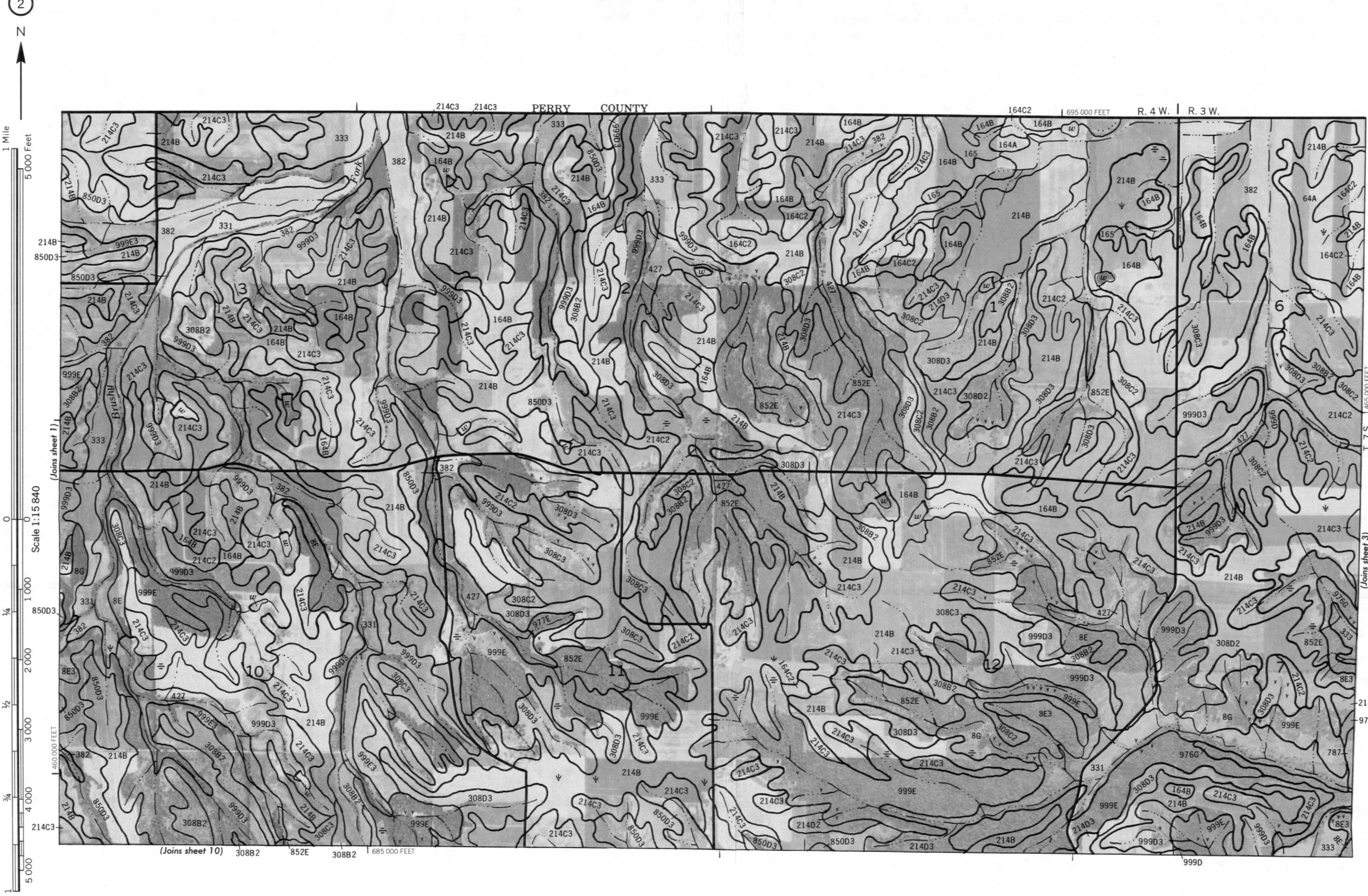
1
0
1 000
2 000
3 000
4 000
5 000

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

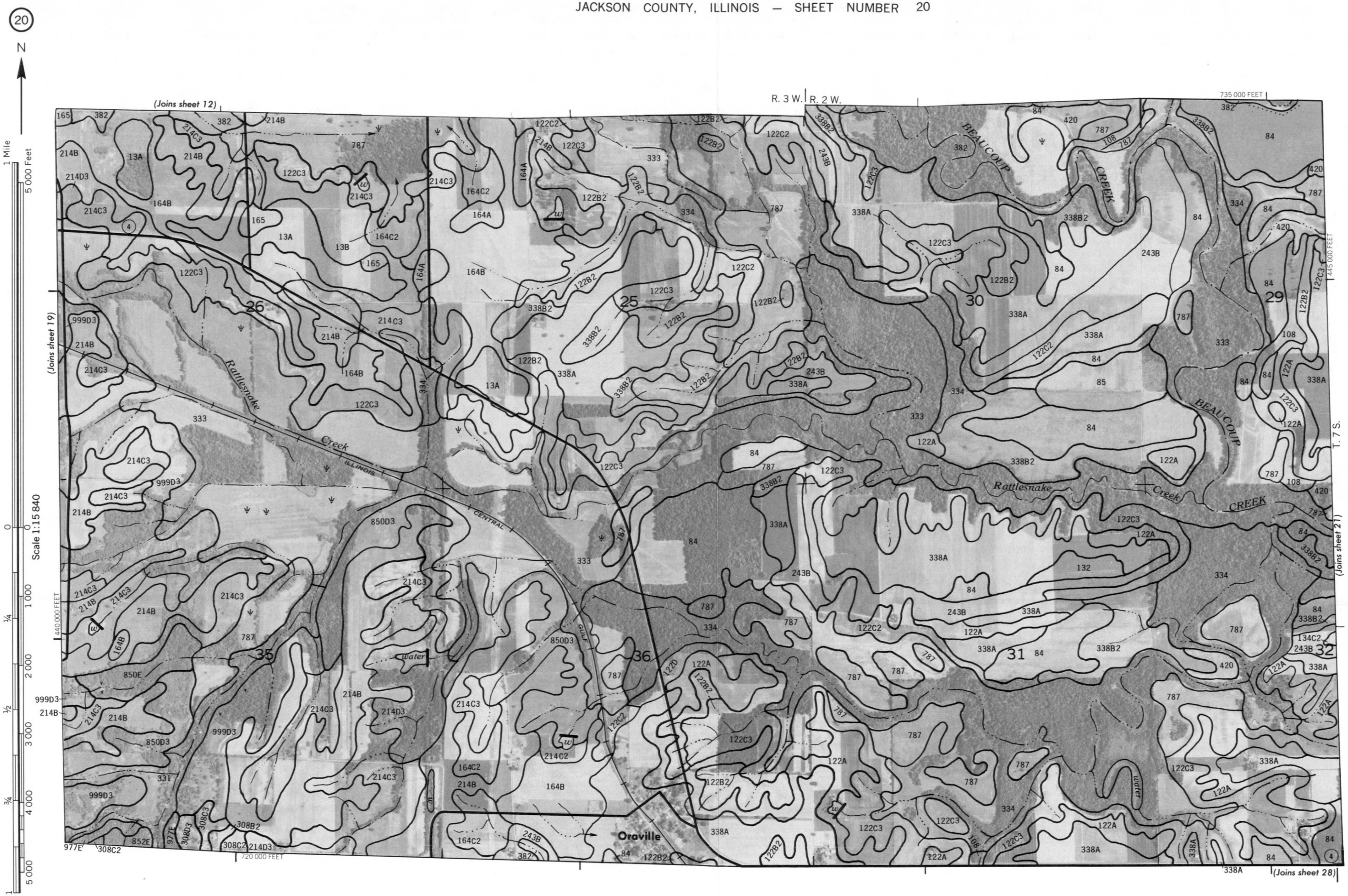


This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

JACKSON COUNTY, ILLINOIS — SHEET NUMBER 2



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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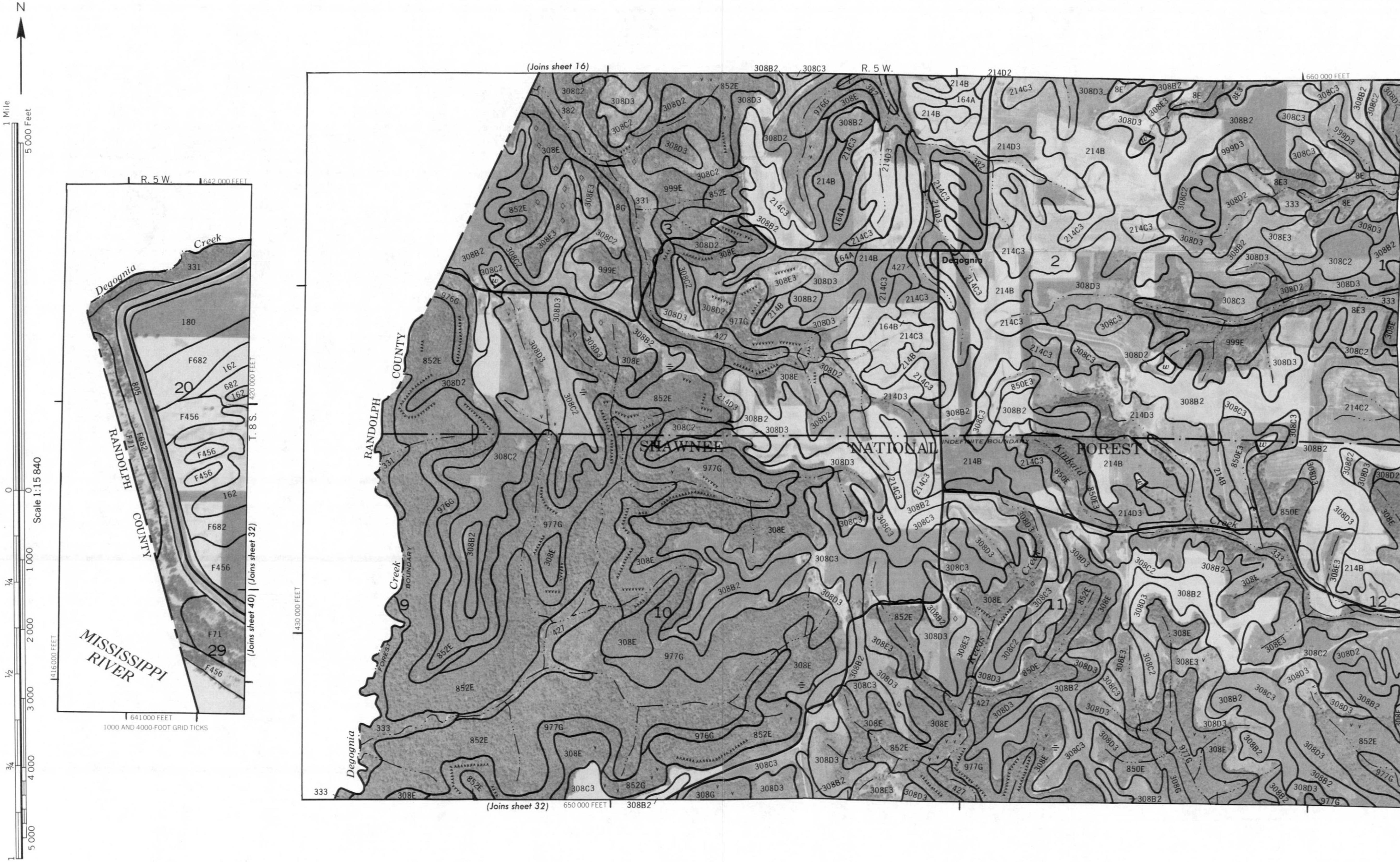
JACKSON COUNTY, ILLINOIS — SHEET NUMBER 22

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

JACKSON COUNTY, ILLINOIS — SHEET NUMBER 24

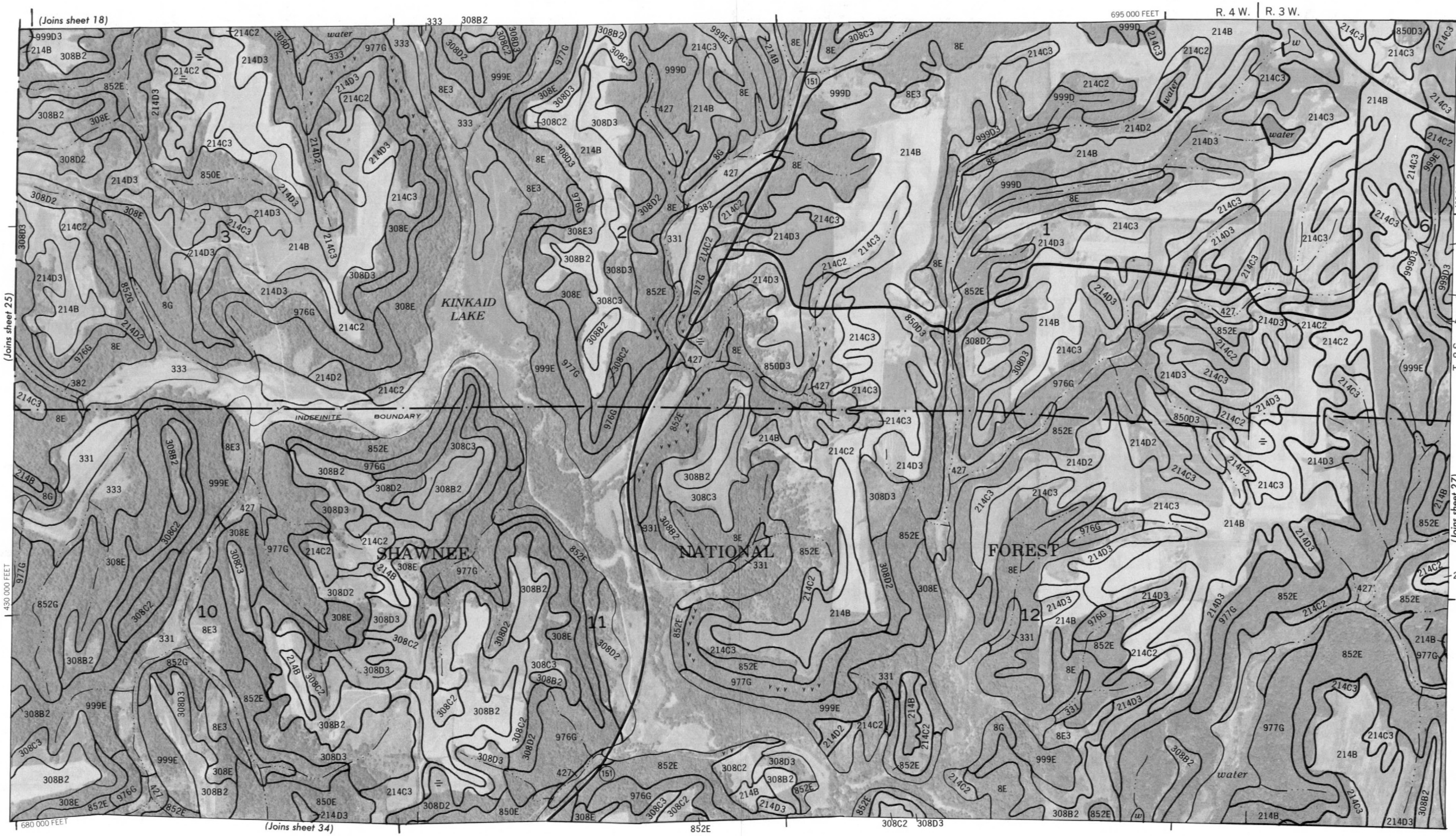


This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

26

N



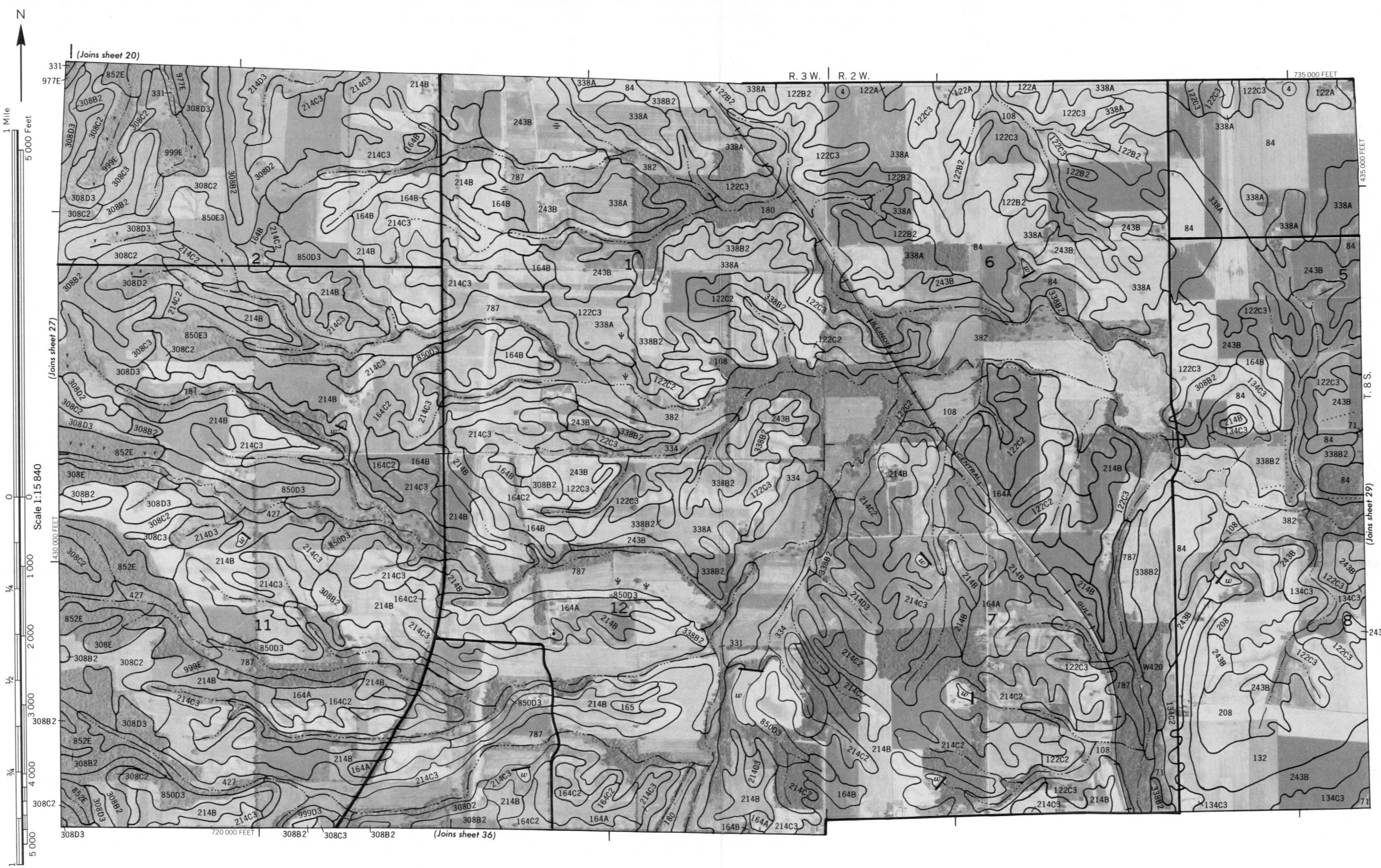
Scale 1:15 840

1 Mile

5 000 Feet

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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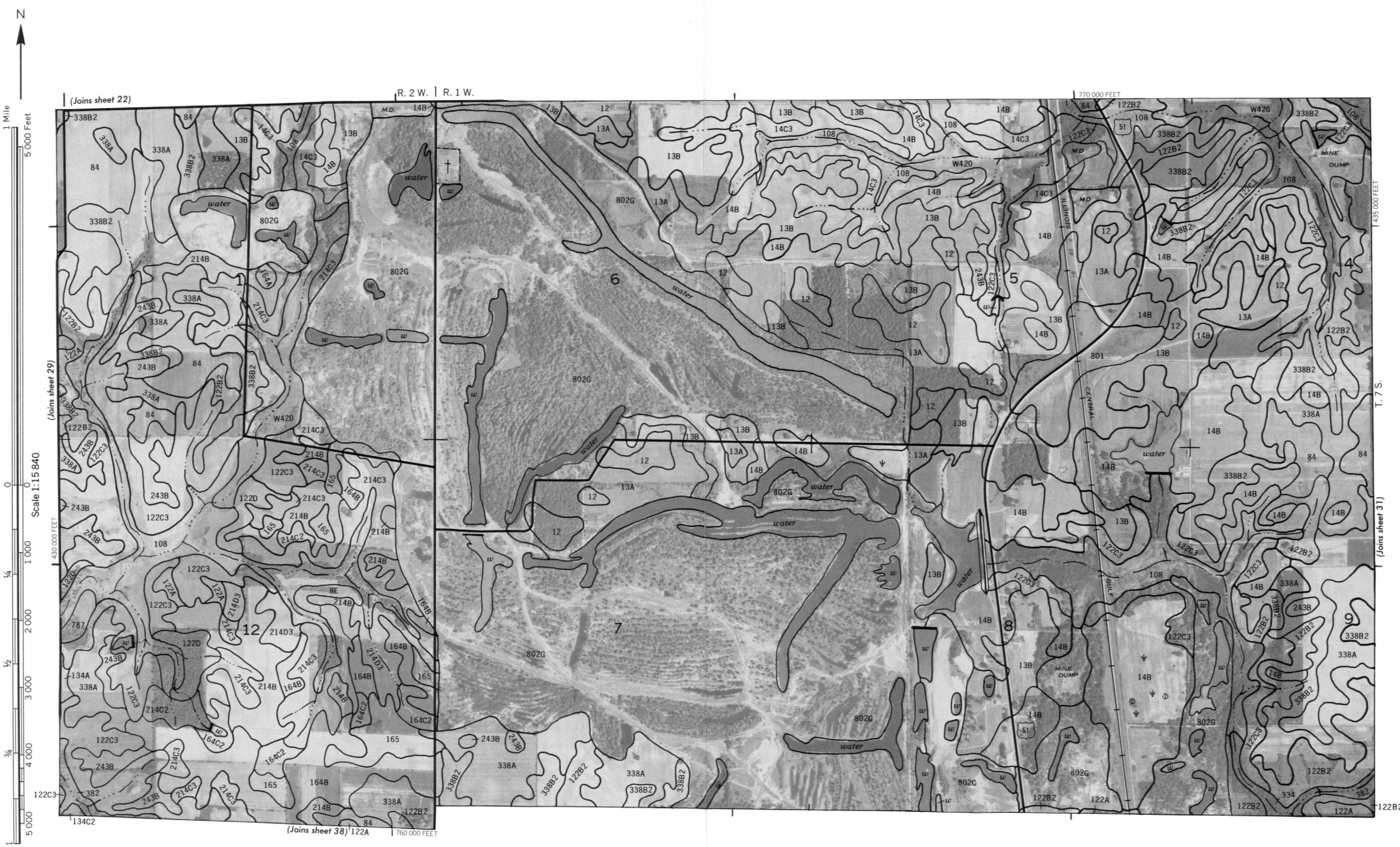
30



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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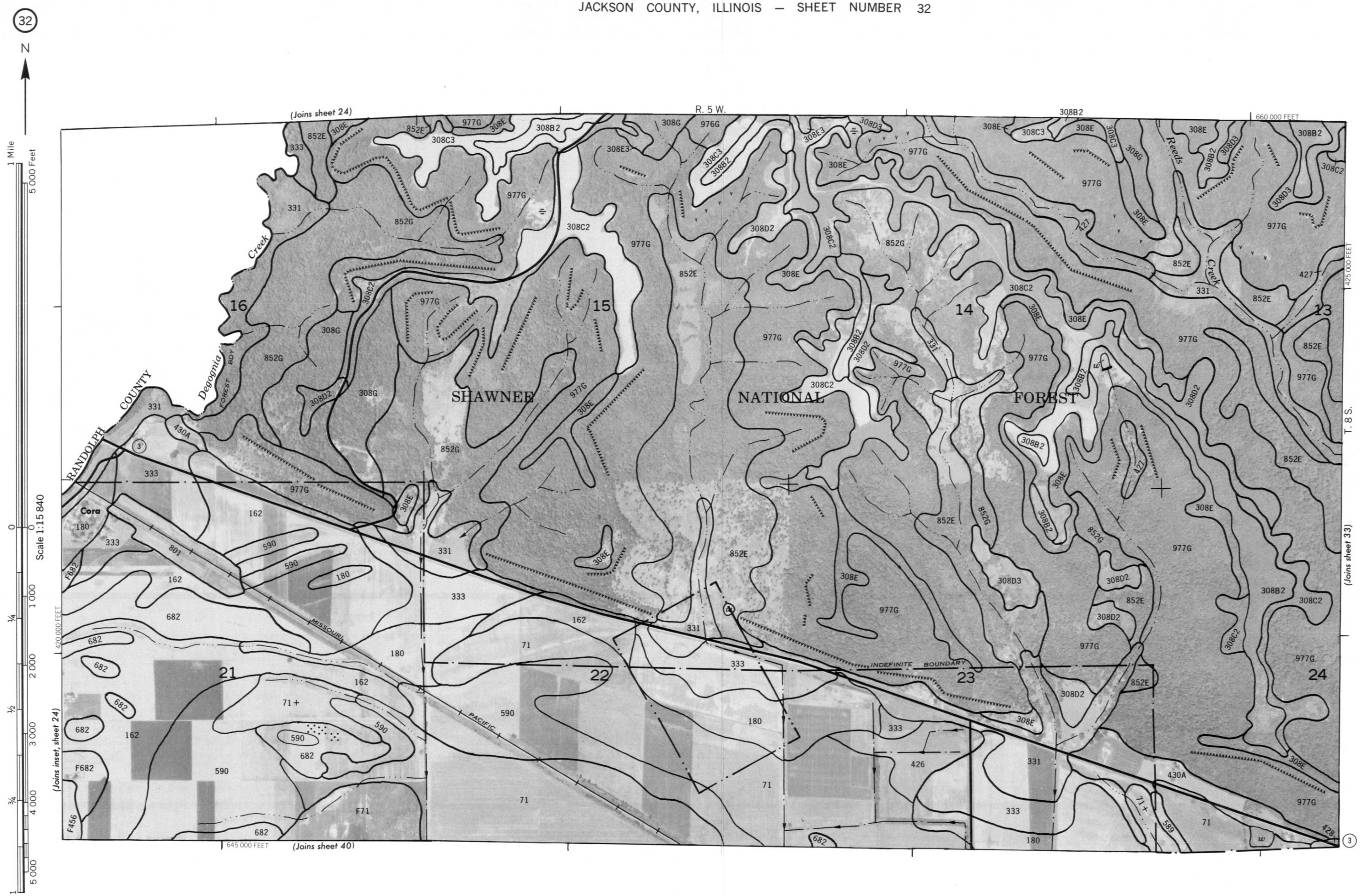
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
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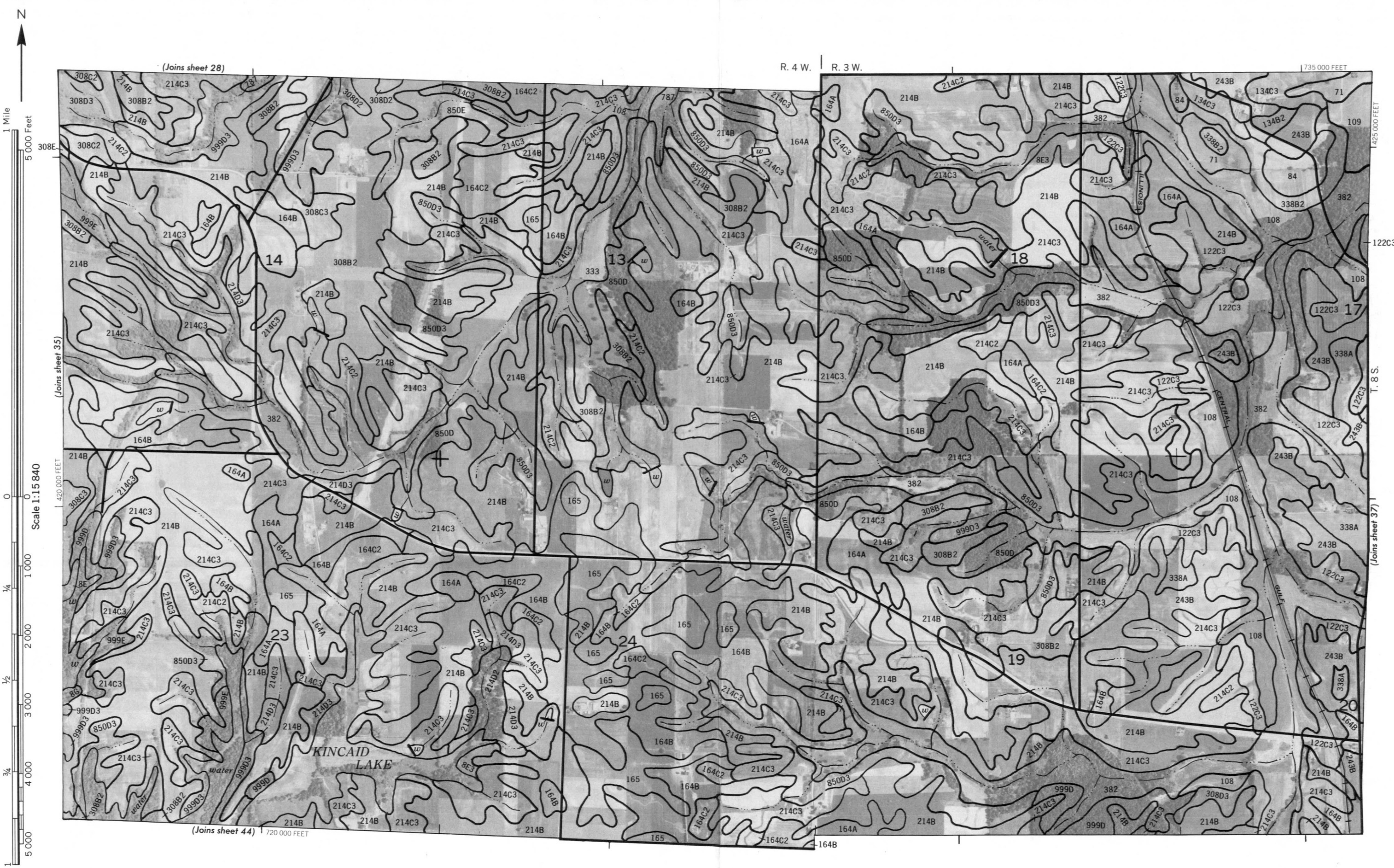
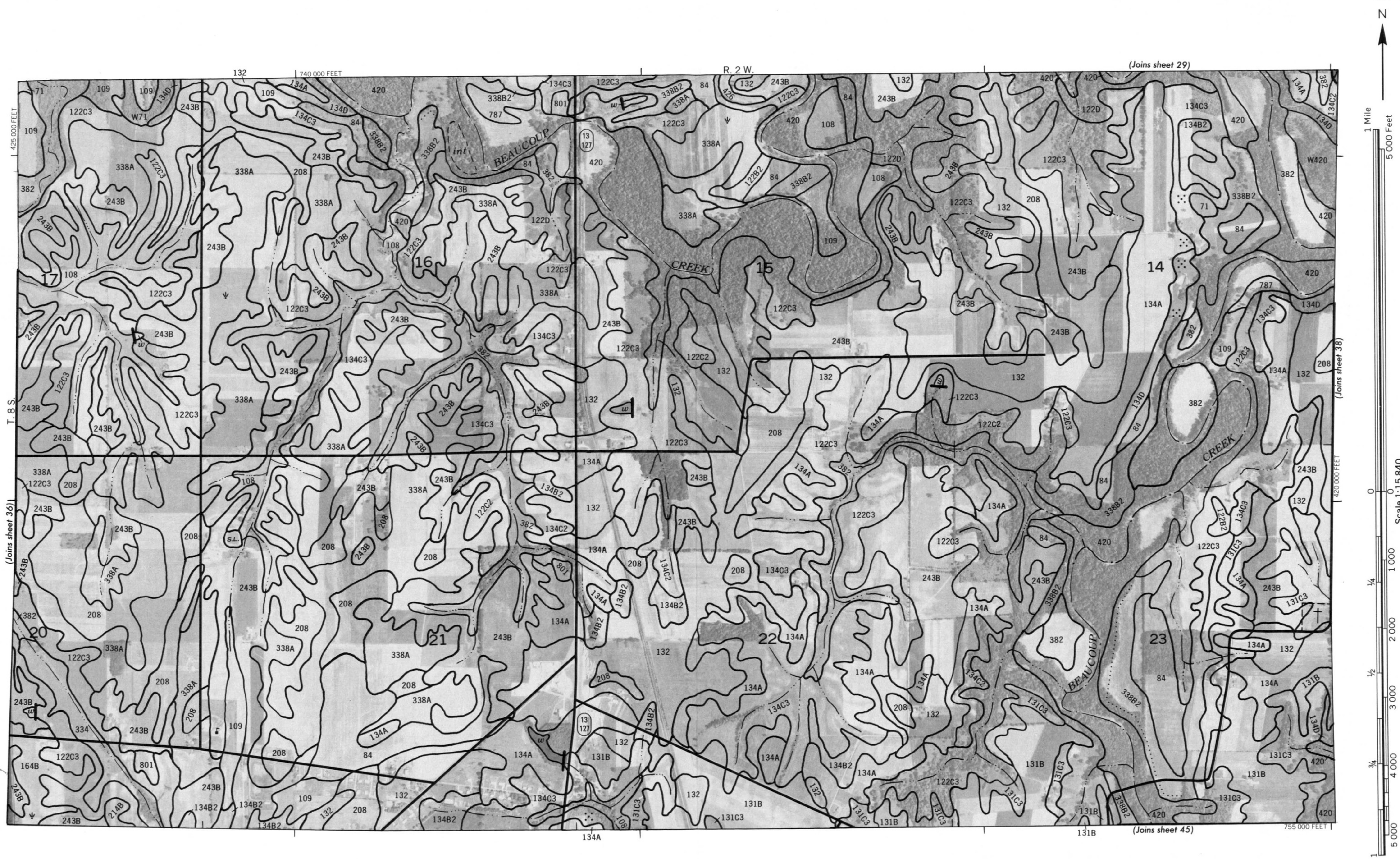
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

36

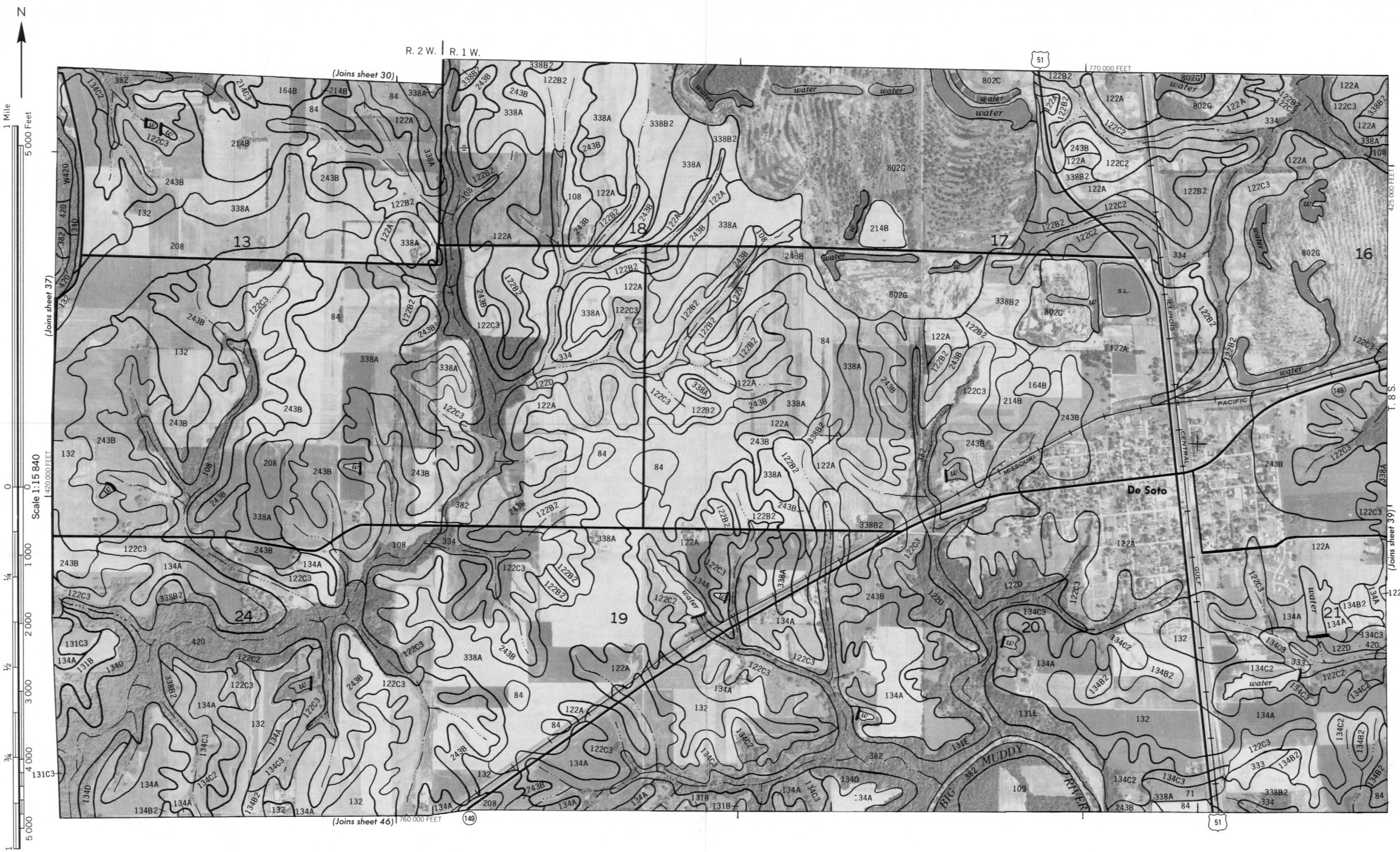


This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

JACKSON COUNTY, ILLINOIS — SHEET NUMBER 37



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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4

N

1 Mile

5 000 Feet

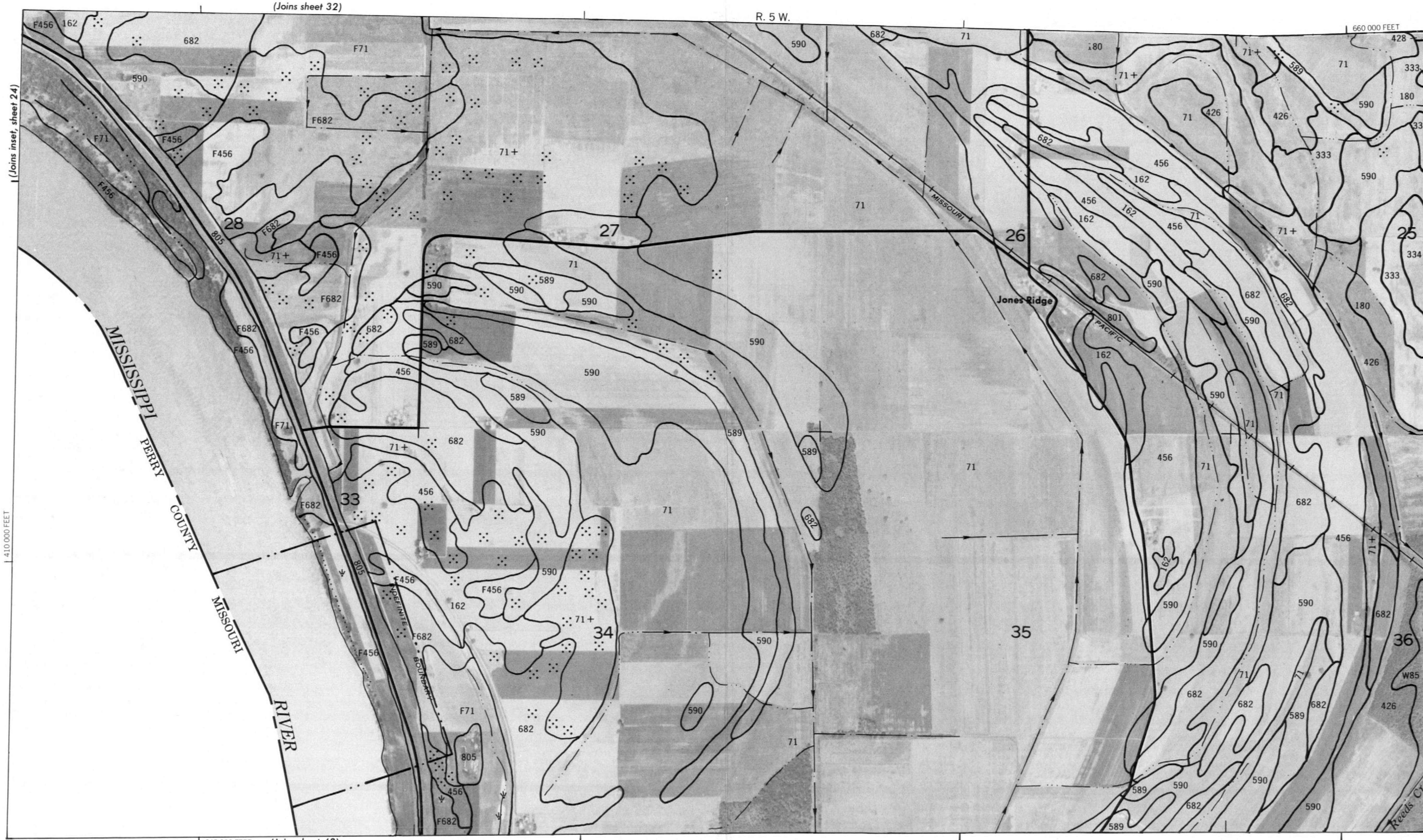
Scale 1:15 840

0 1 000 2 000 3 000 4 000 5 000

¼ ½ ¾ 1

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N



Scale 1:15 840
1 Mile
5 000 Feet

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
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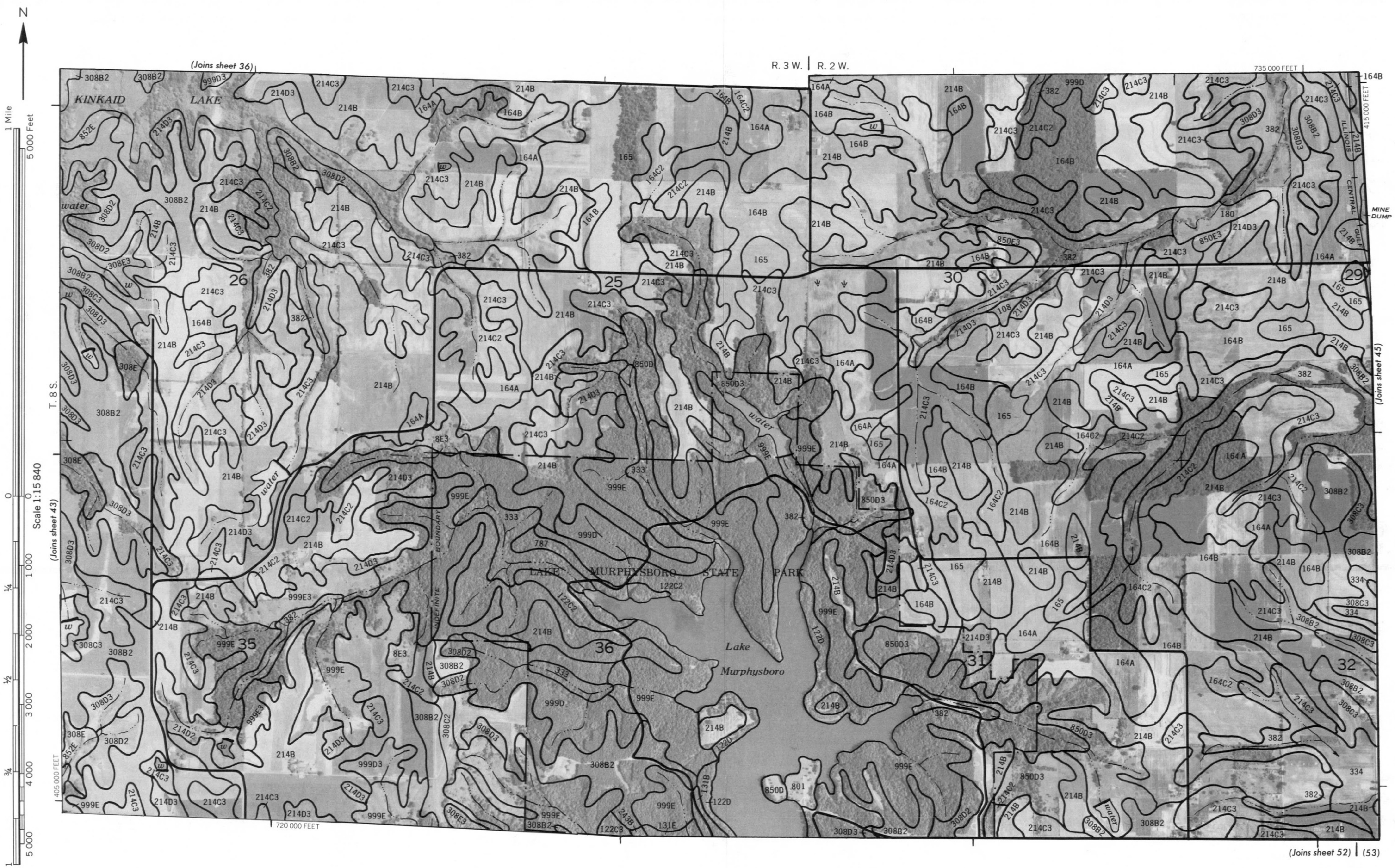

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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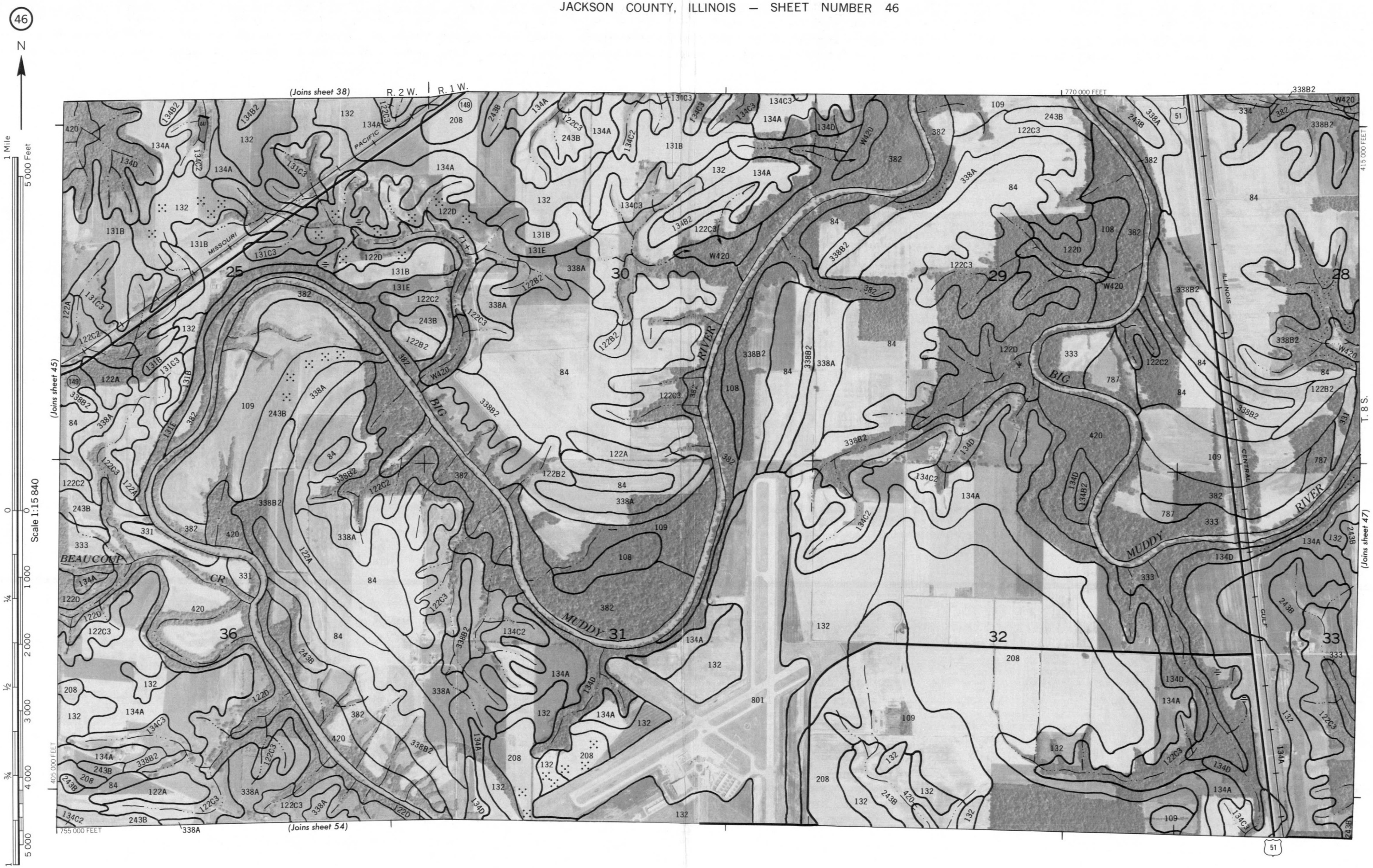
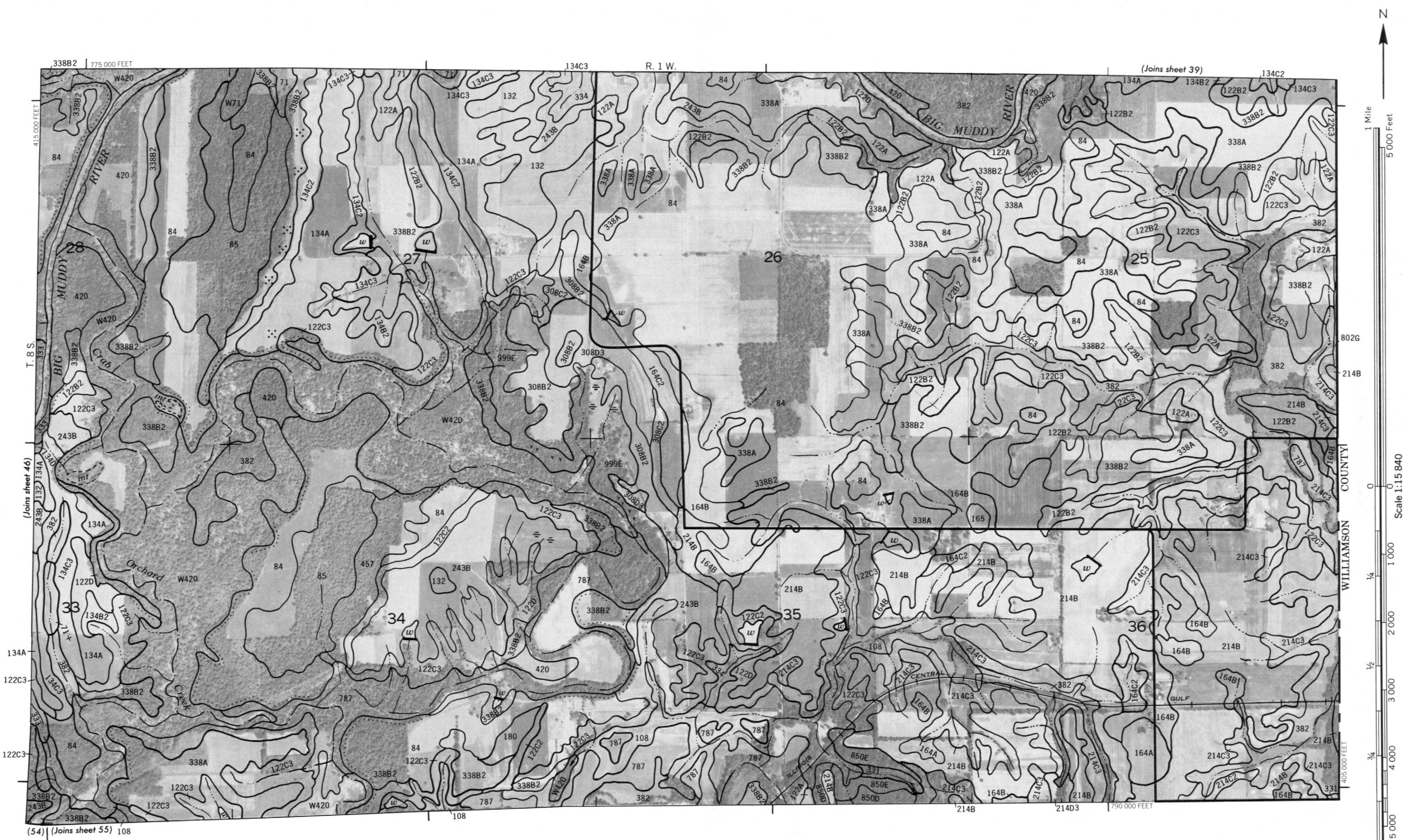
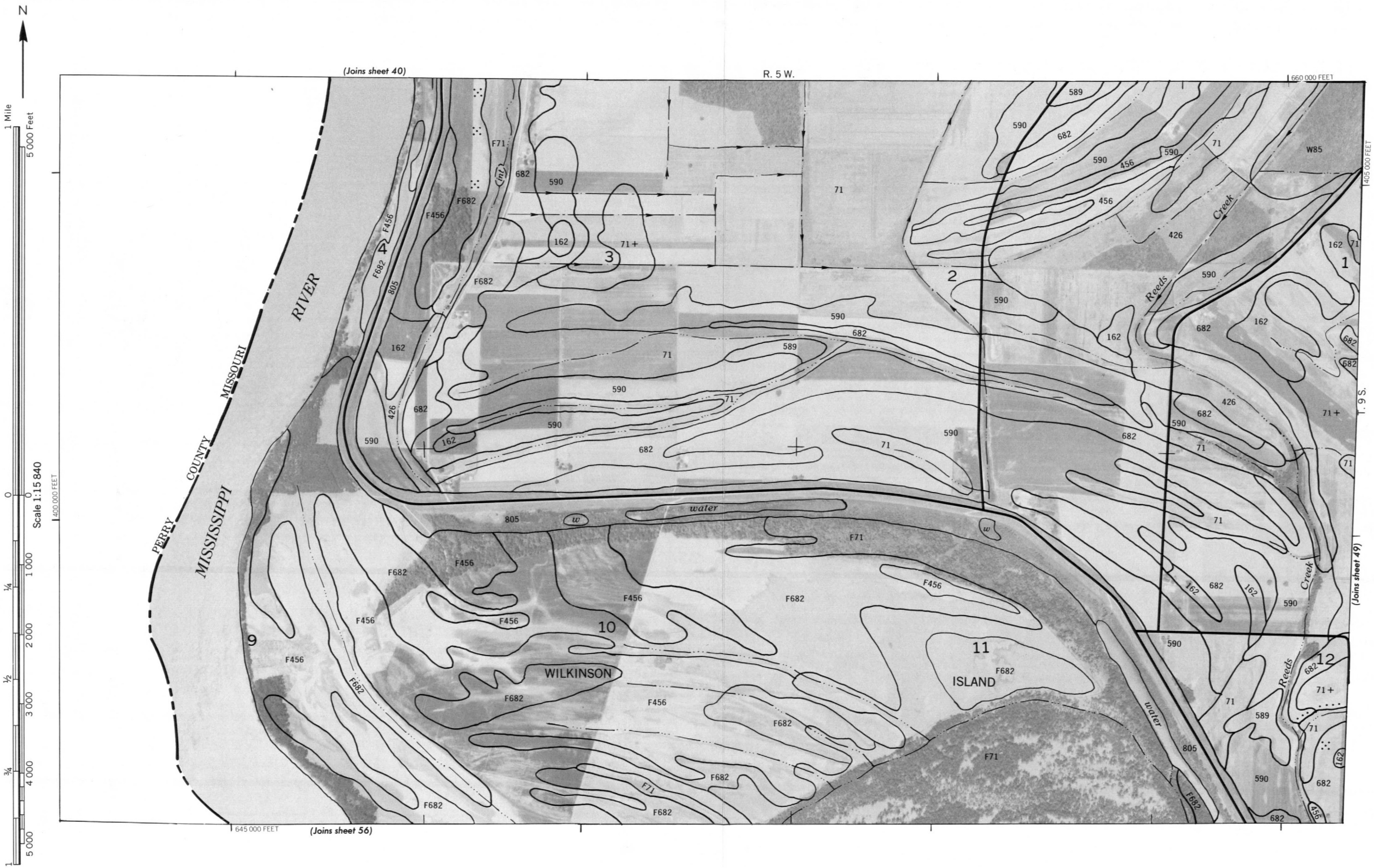


This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



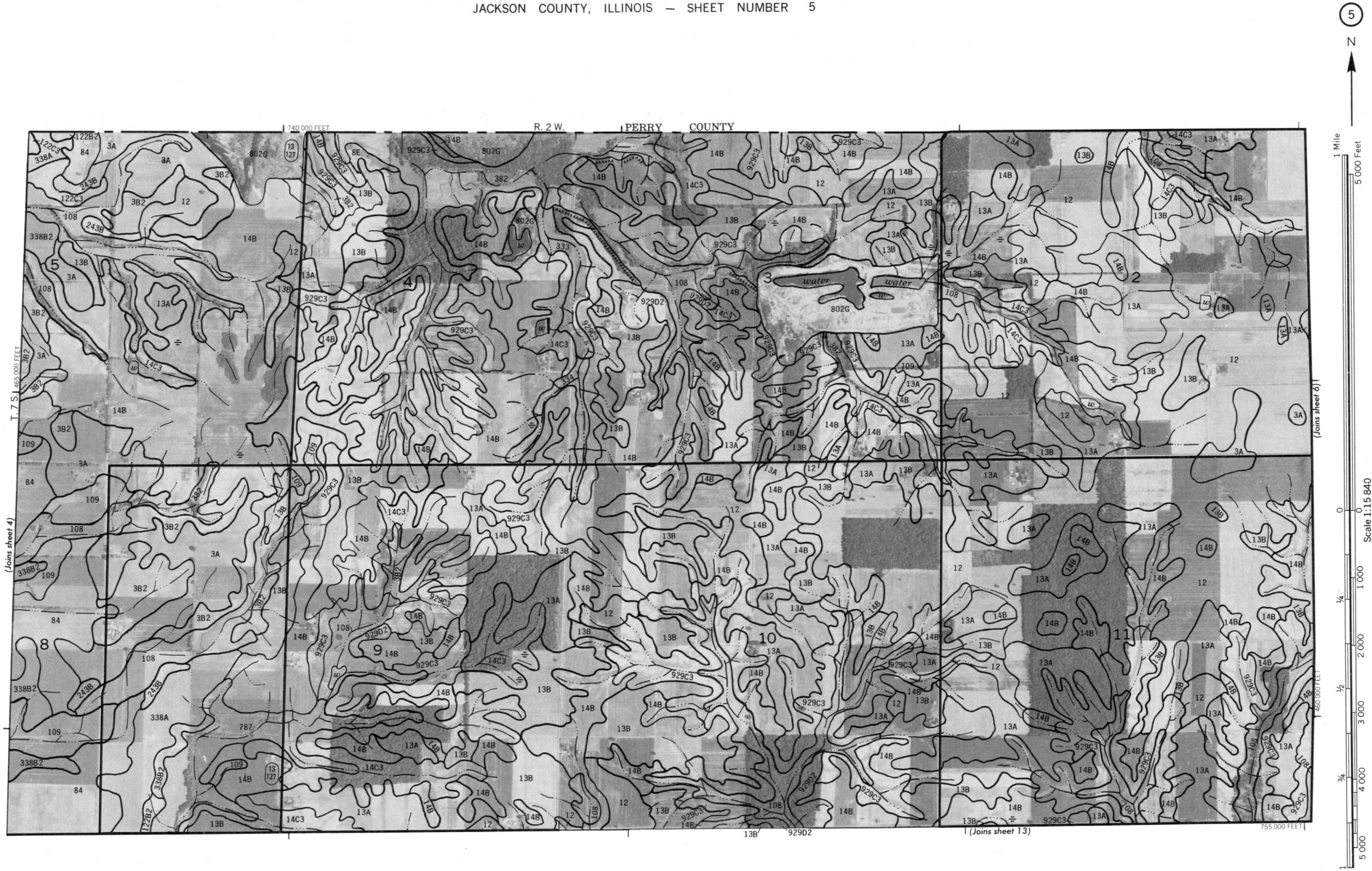
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

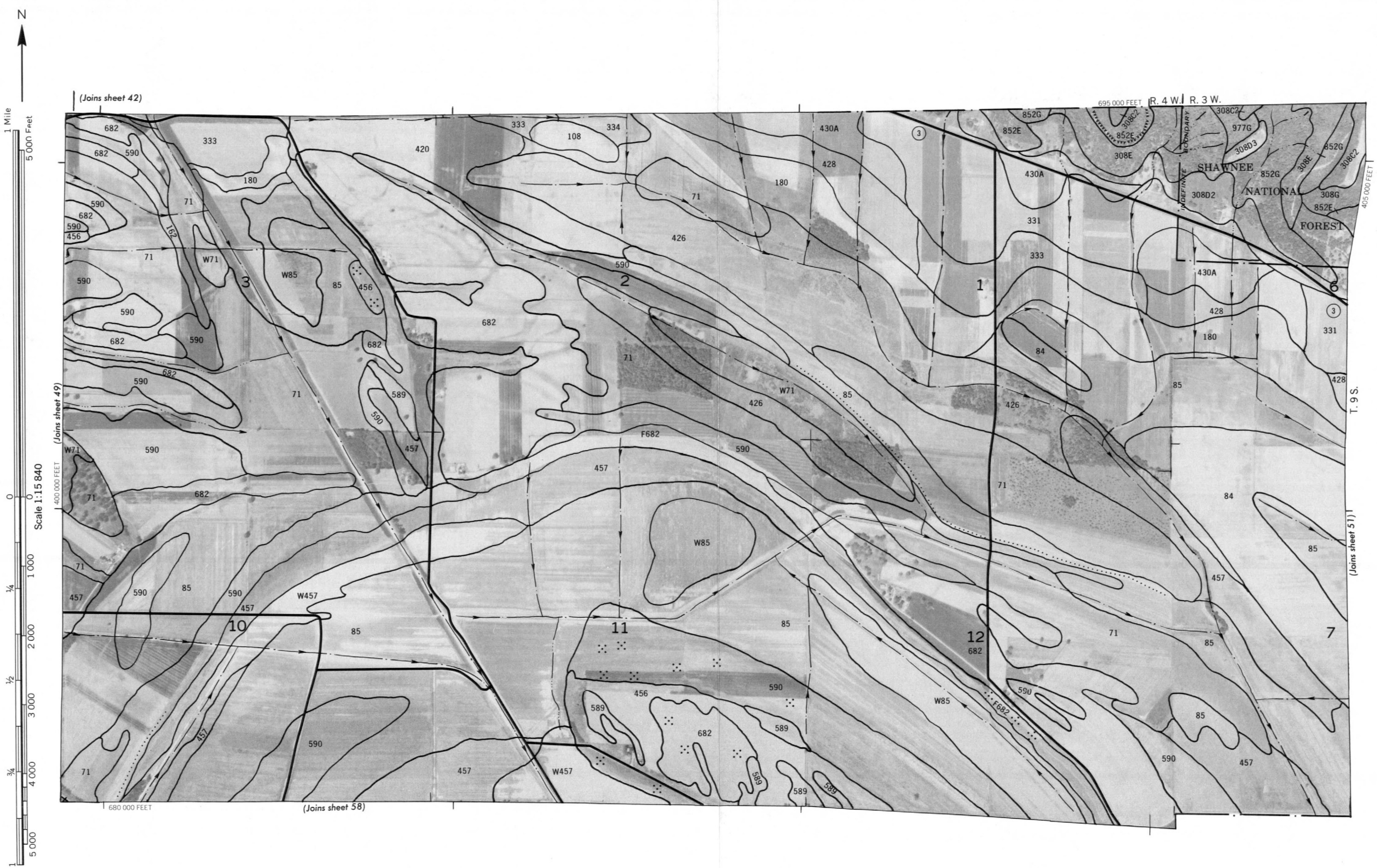
N

1 Mile
5 000 Feet
Scale 1:15 840
0 1 000 2 000 3 000 4 000 5 000
0 ¼ ½ ¾



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

50



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
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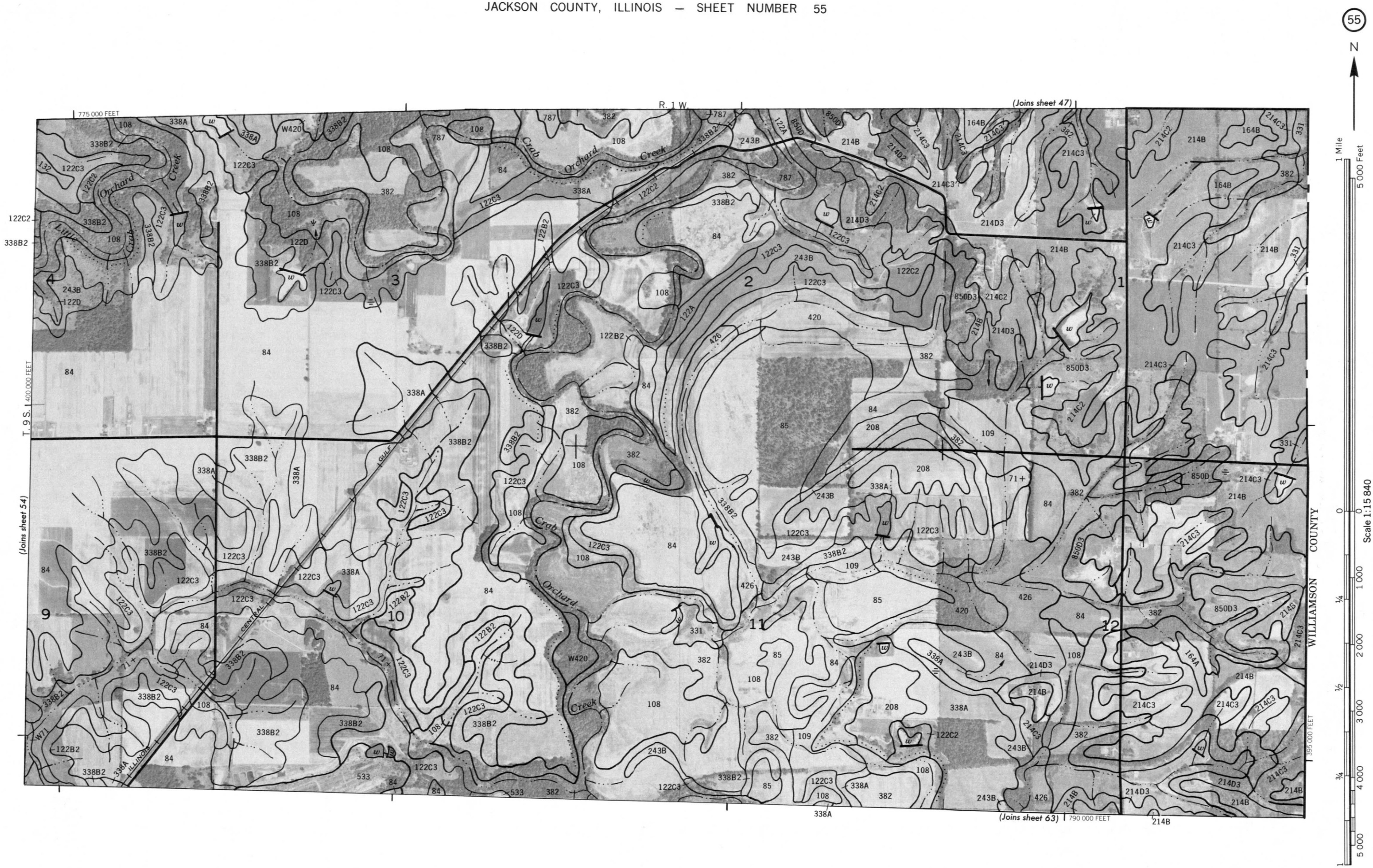
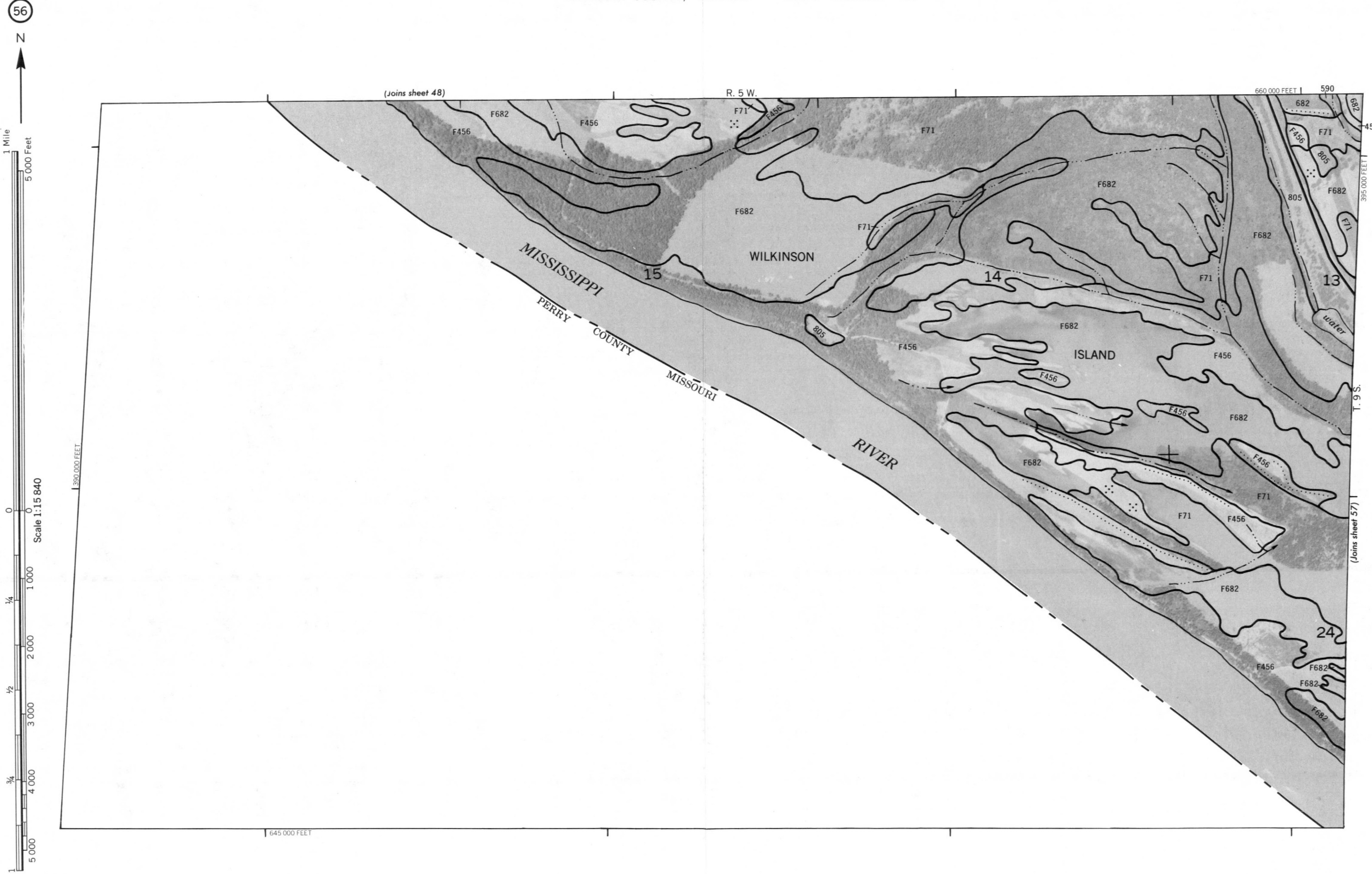
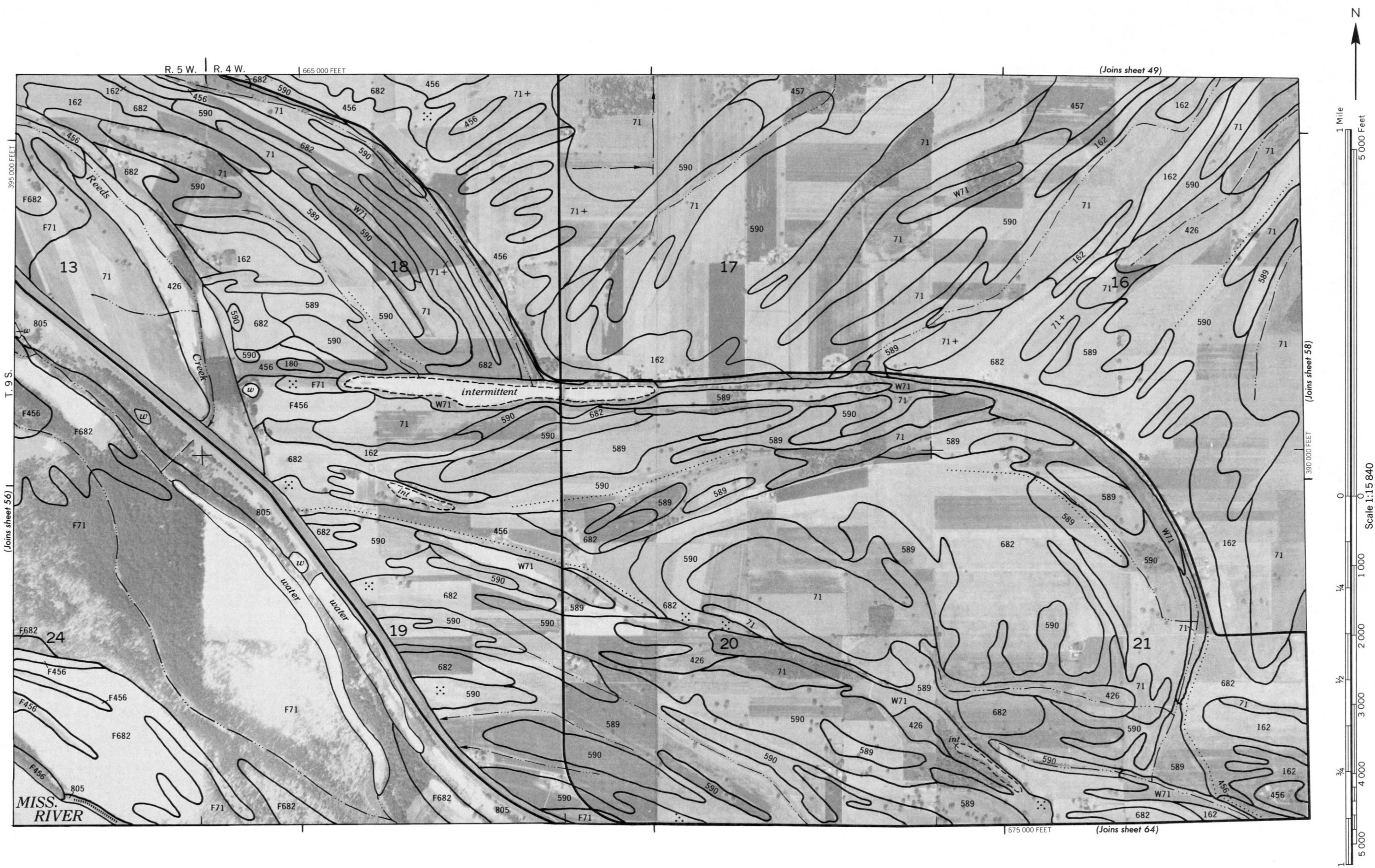


This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



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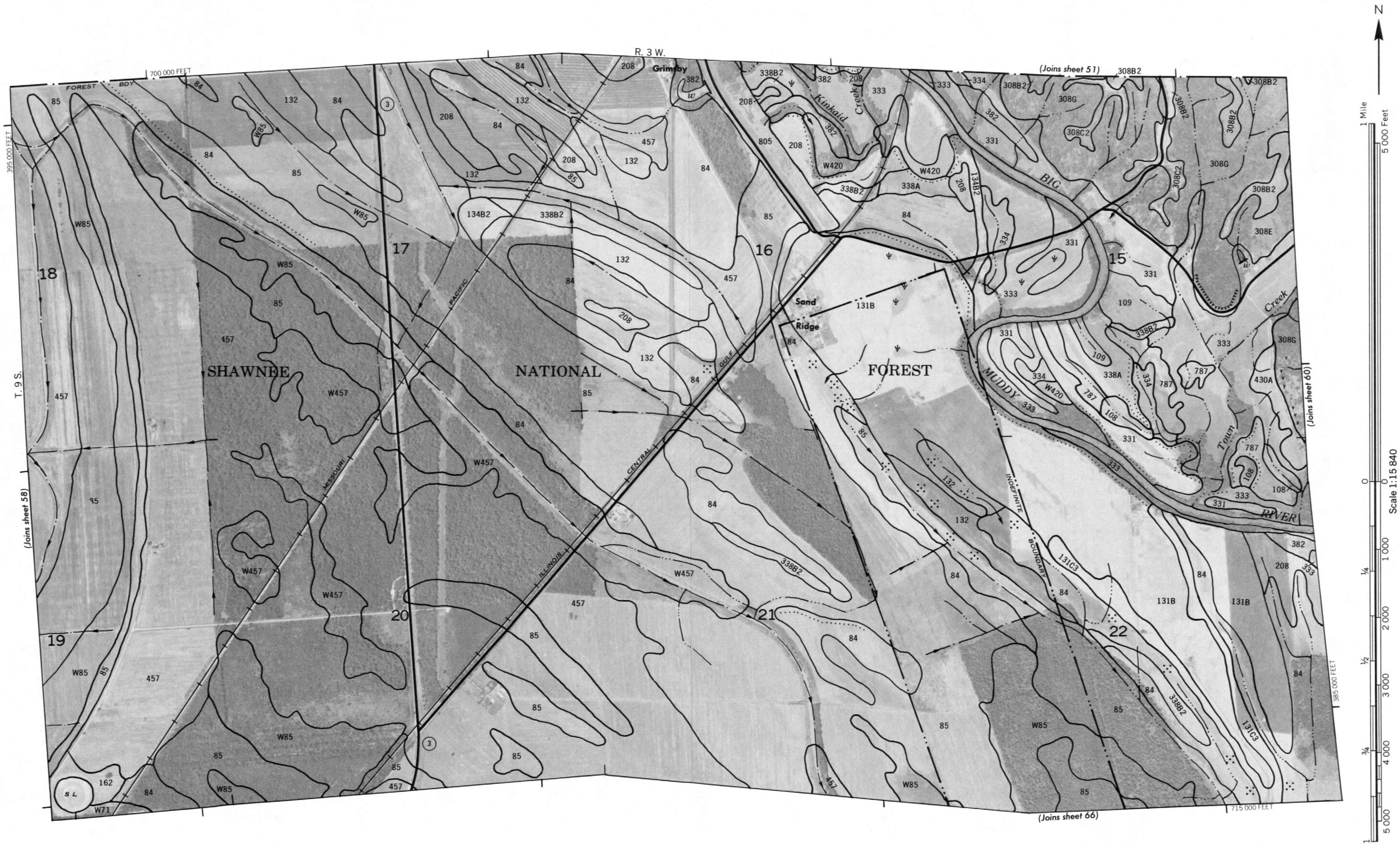
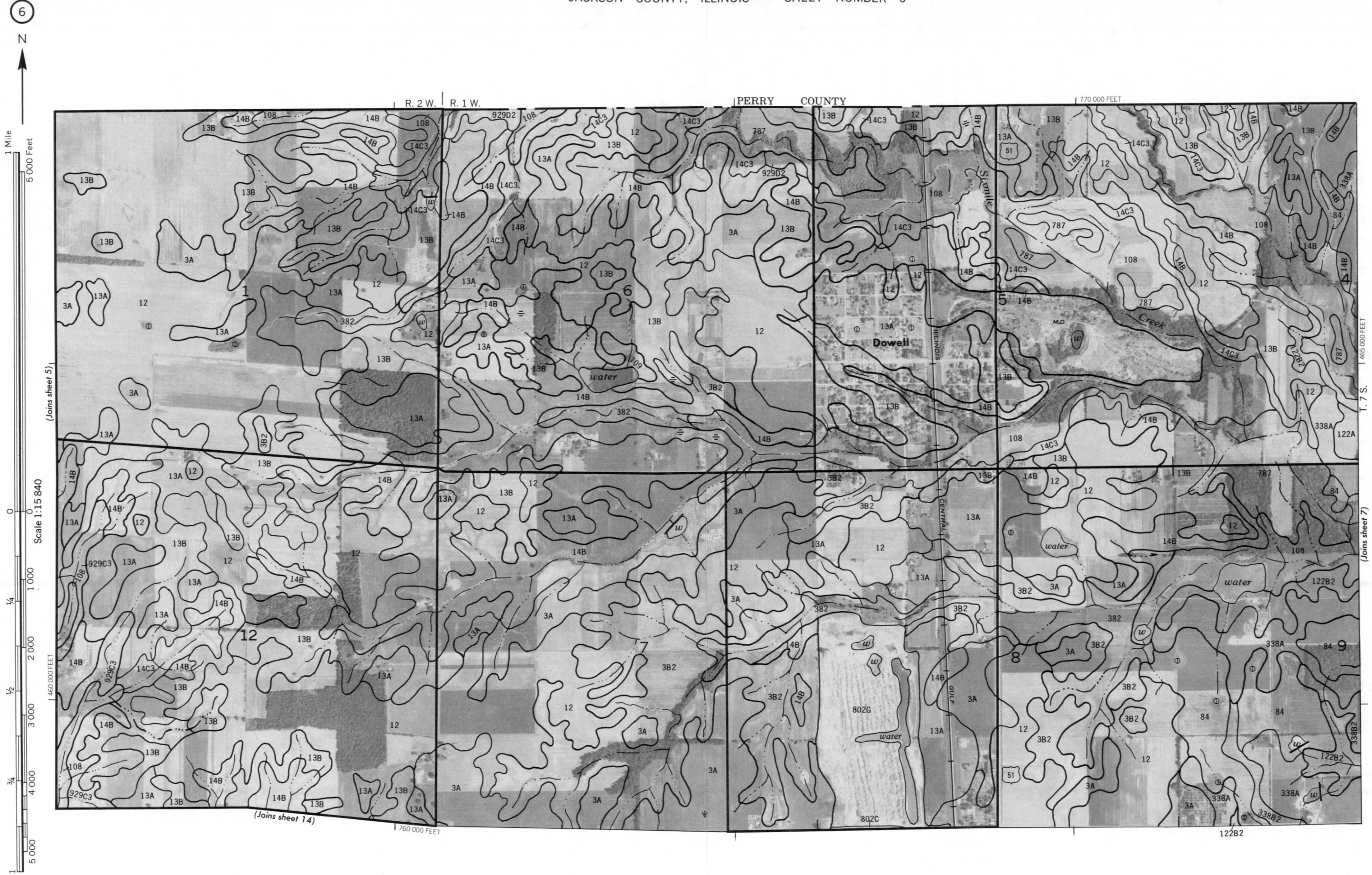


JACKSON COUNTY, ILLINOIS — SHEET NUMBER 6



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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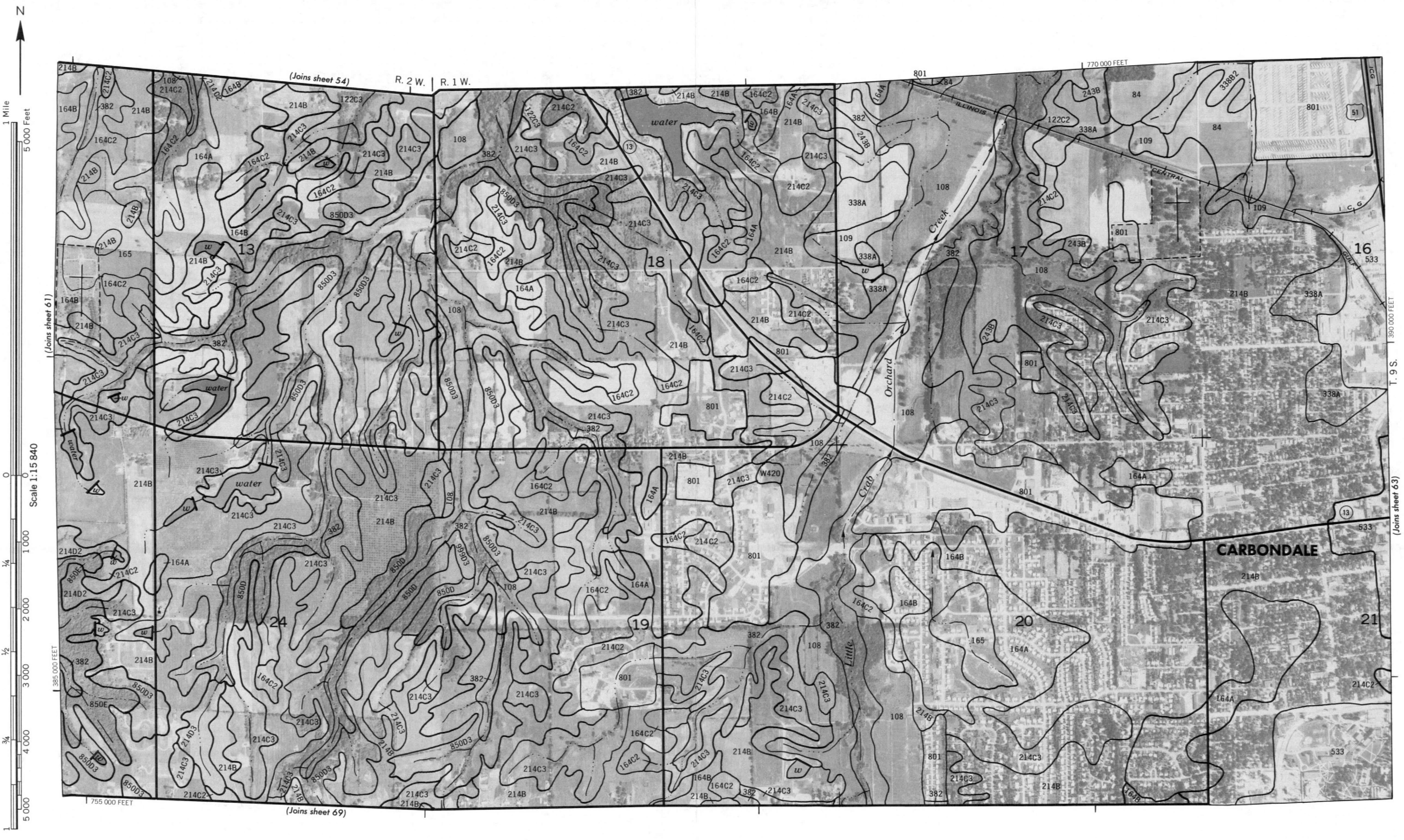
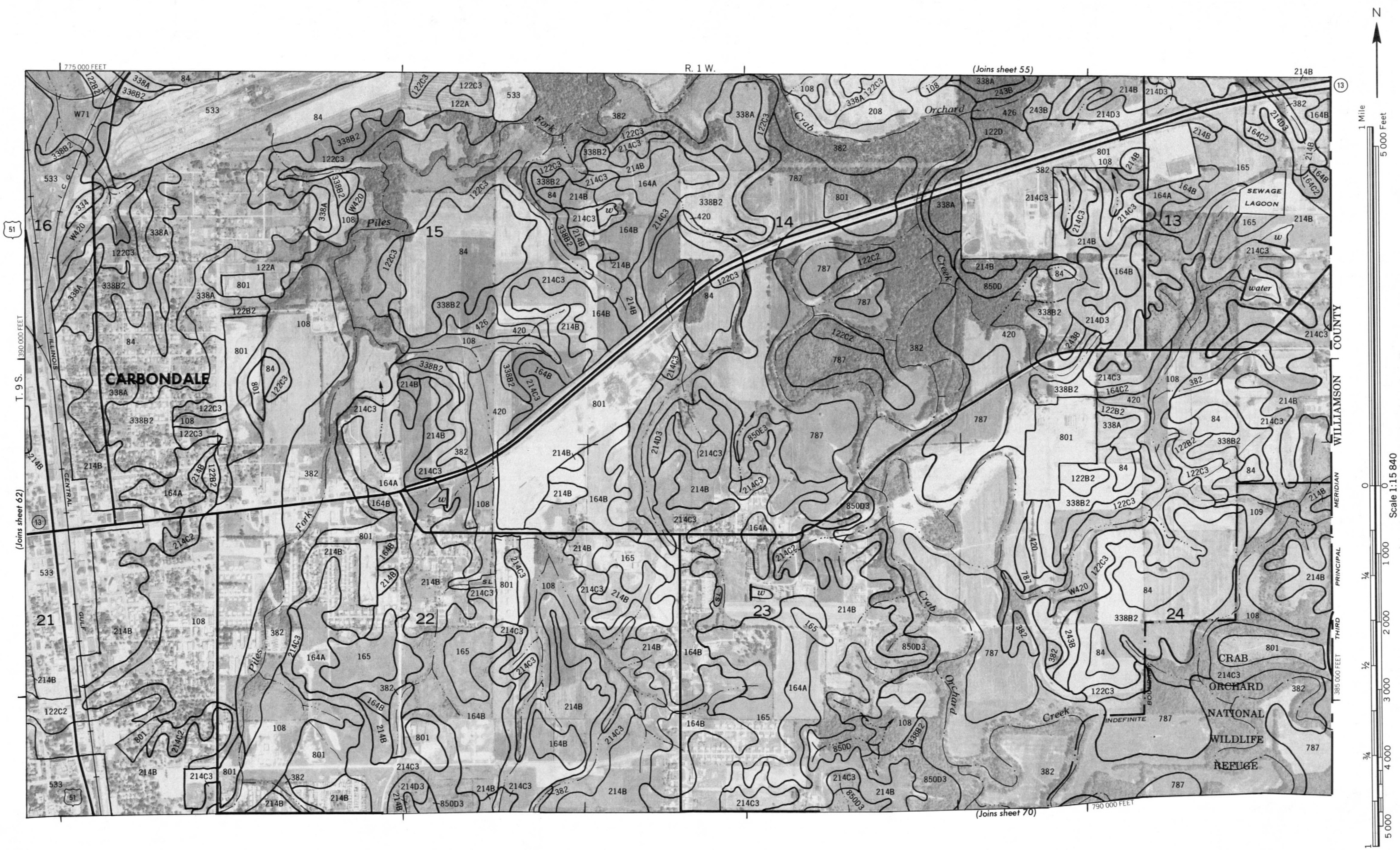


This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
(Joins sheet 55)
(Joins sheet 62)
(Joins sheet 70)
R. 1 W.
T. 9 S.
775 000 FEET
790 000 FEET
390 000 FEET
385 000 FEET
CARBONDALE
ILLINOIS
CENTRAL
GULF
I C G
SEWAGE
LAGOON
water
Piles
Fork
Crab
Orchard
Creek
CRAB
ORCHARD
NATIONAL
WILDLIFE
REFUGE
WILLIAMSON
COUNTY
THIRD
PRINCIPAL
MERIDIAN
INDEFINITE
BOUNDARY
16
15
14
13
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22
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13
1 Mile
5 000 Feet
Scale 1:15 840
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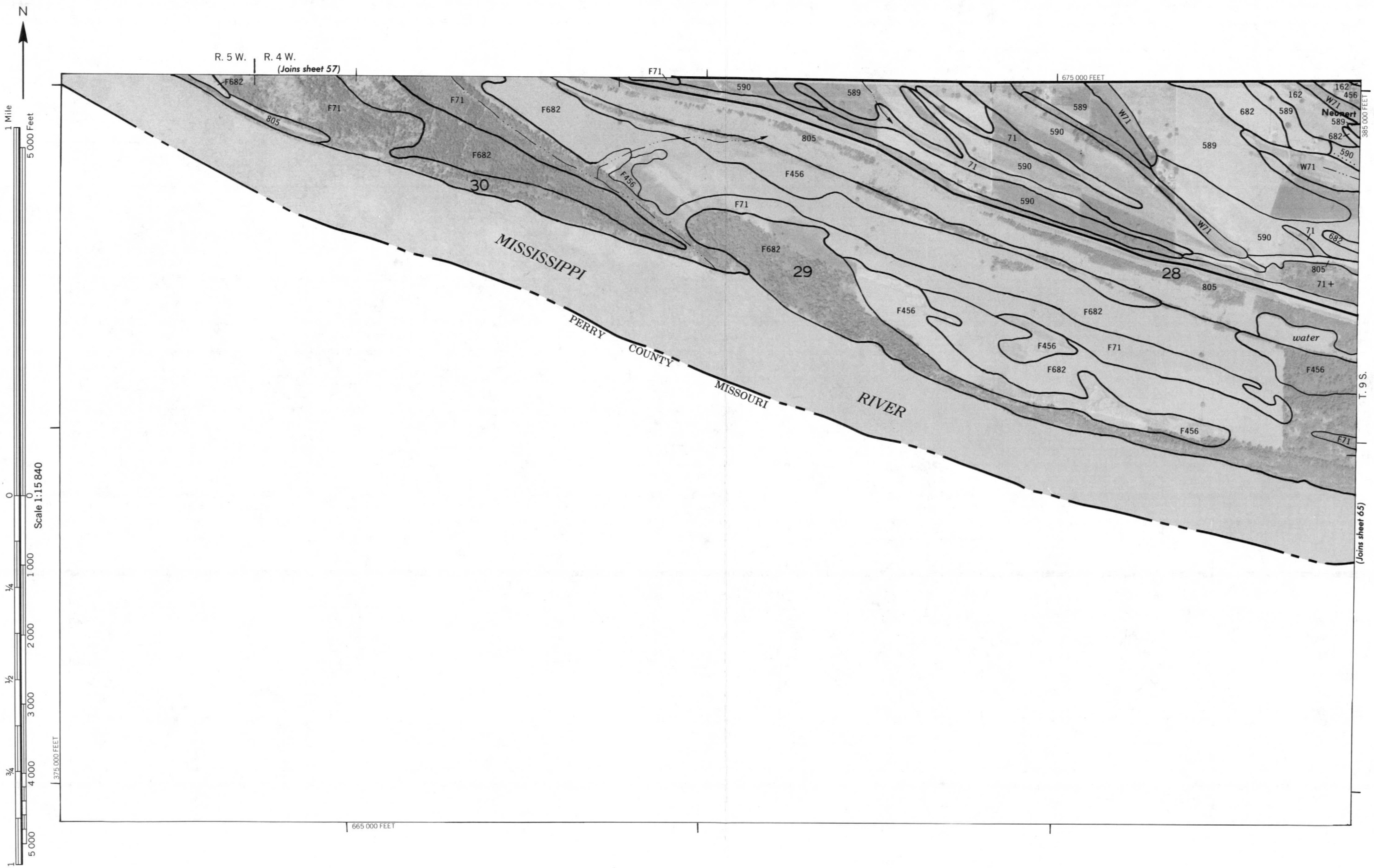

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
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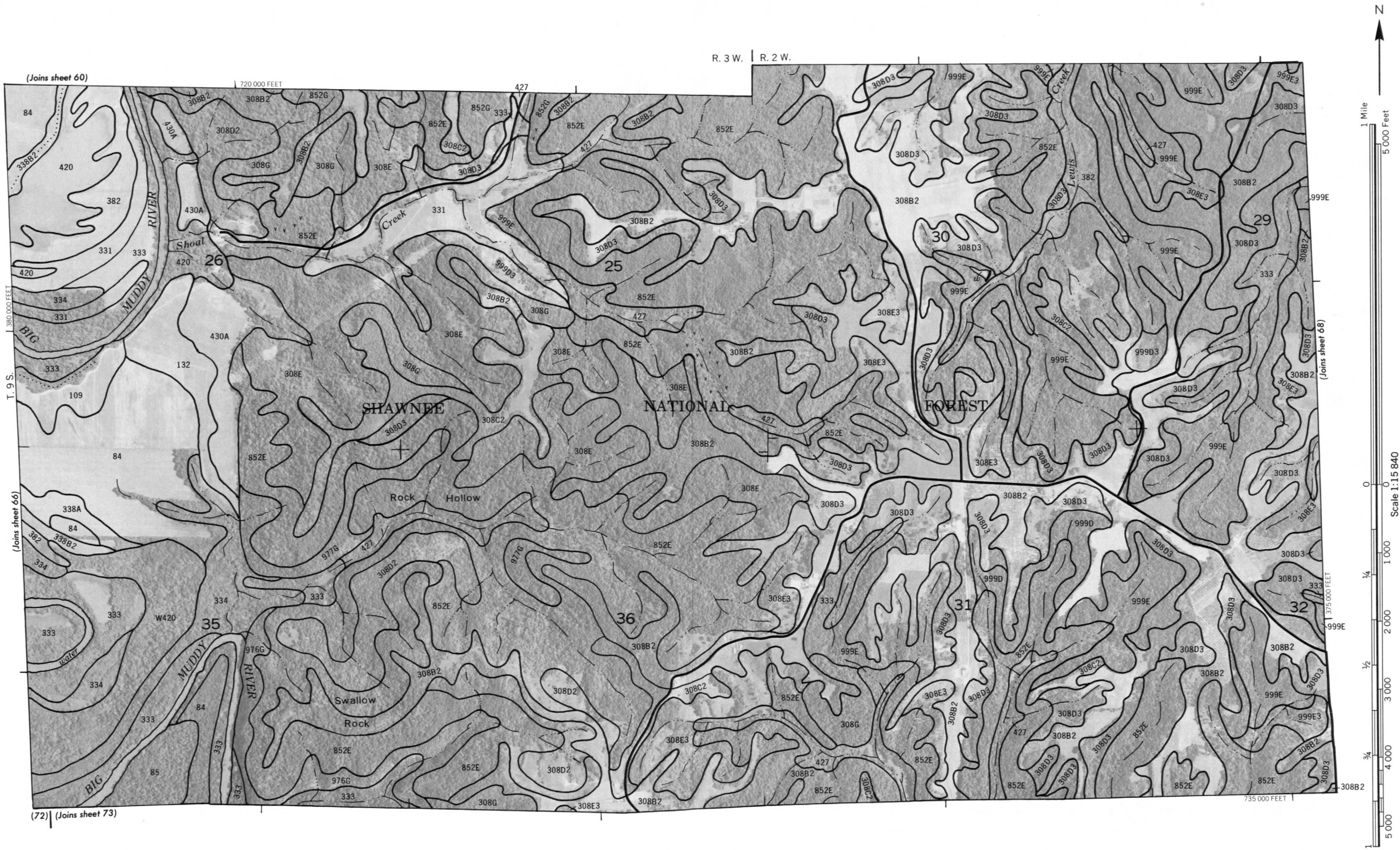
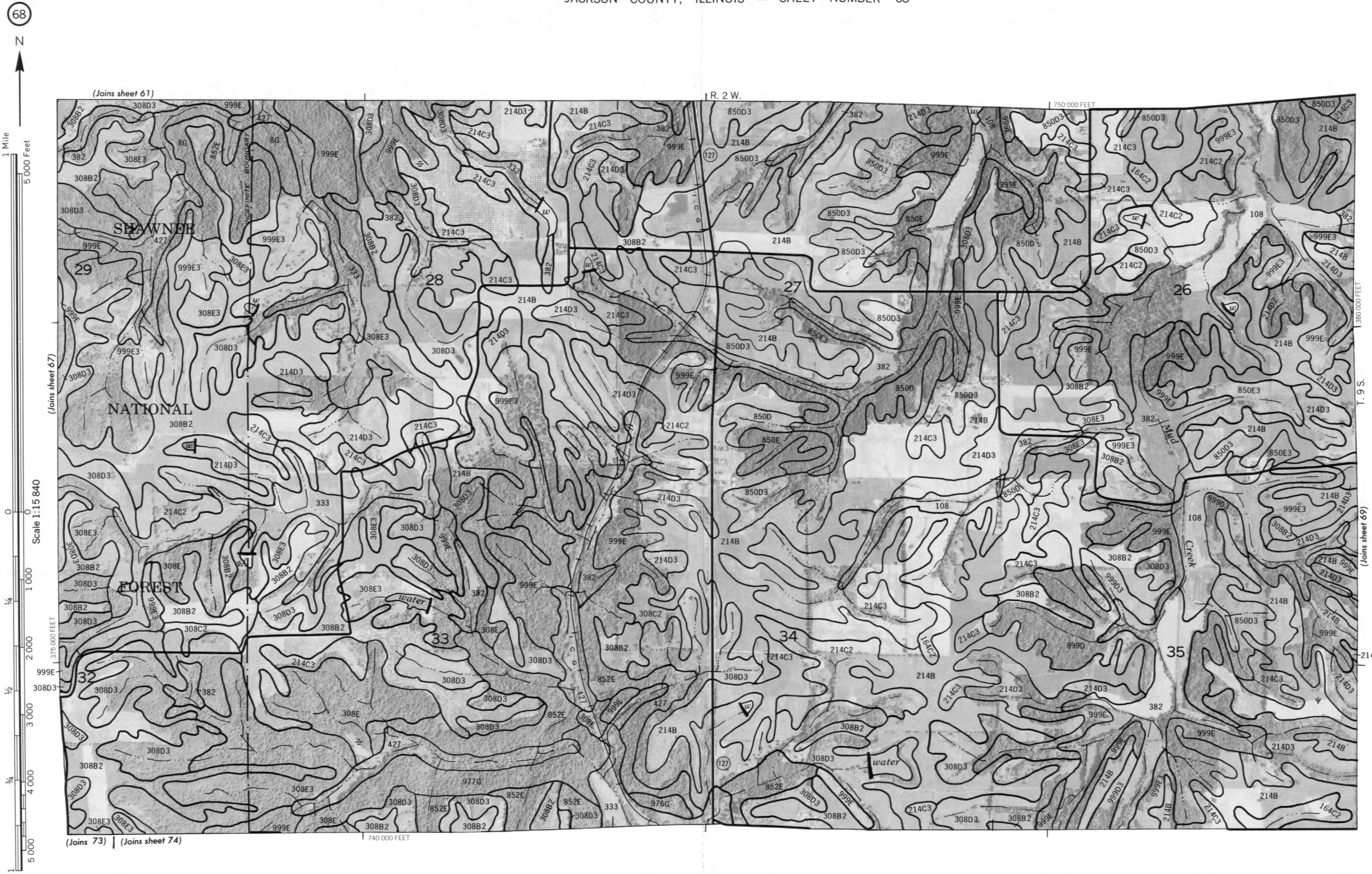
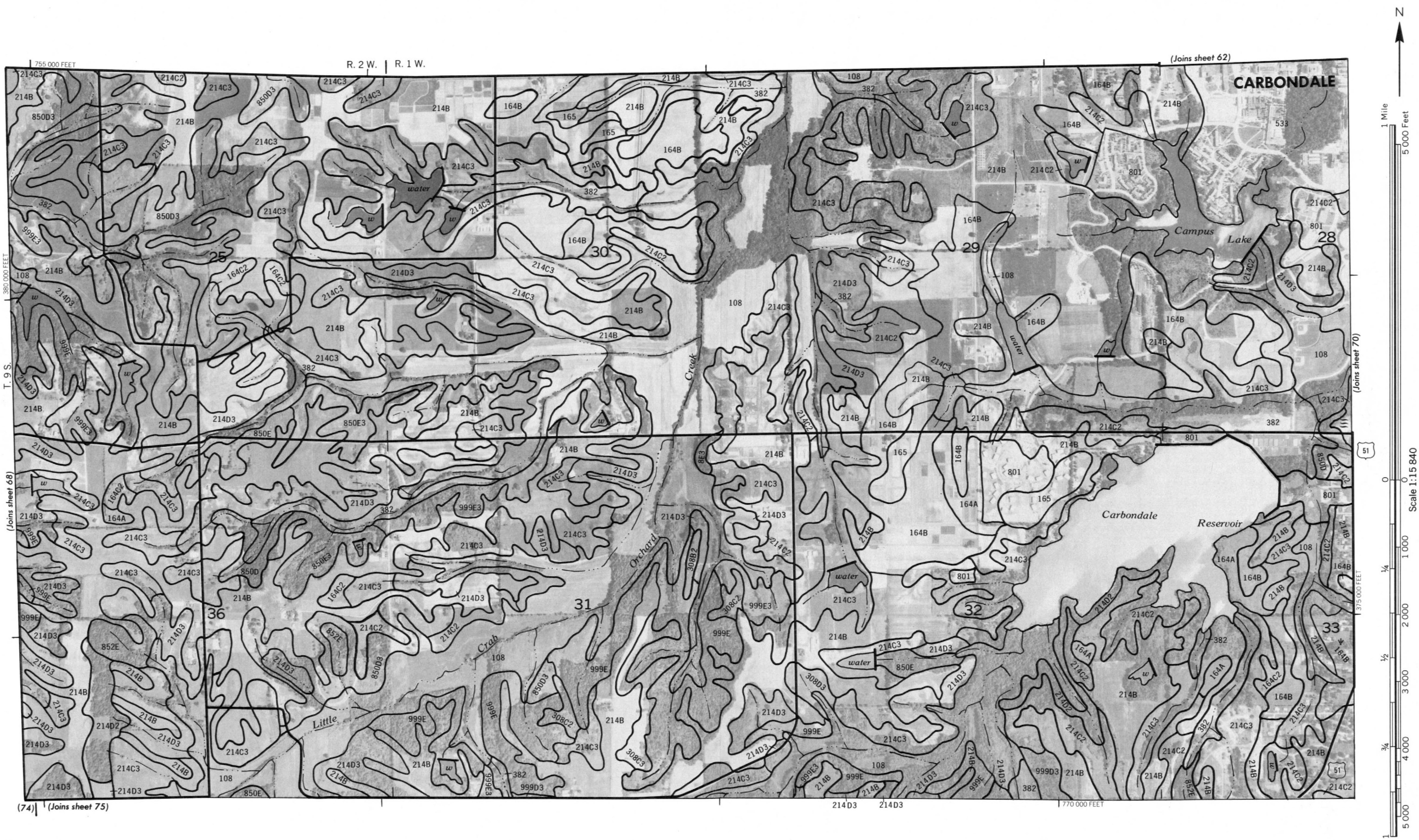


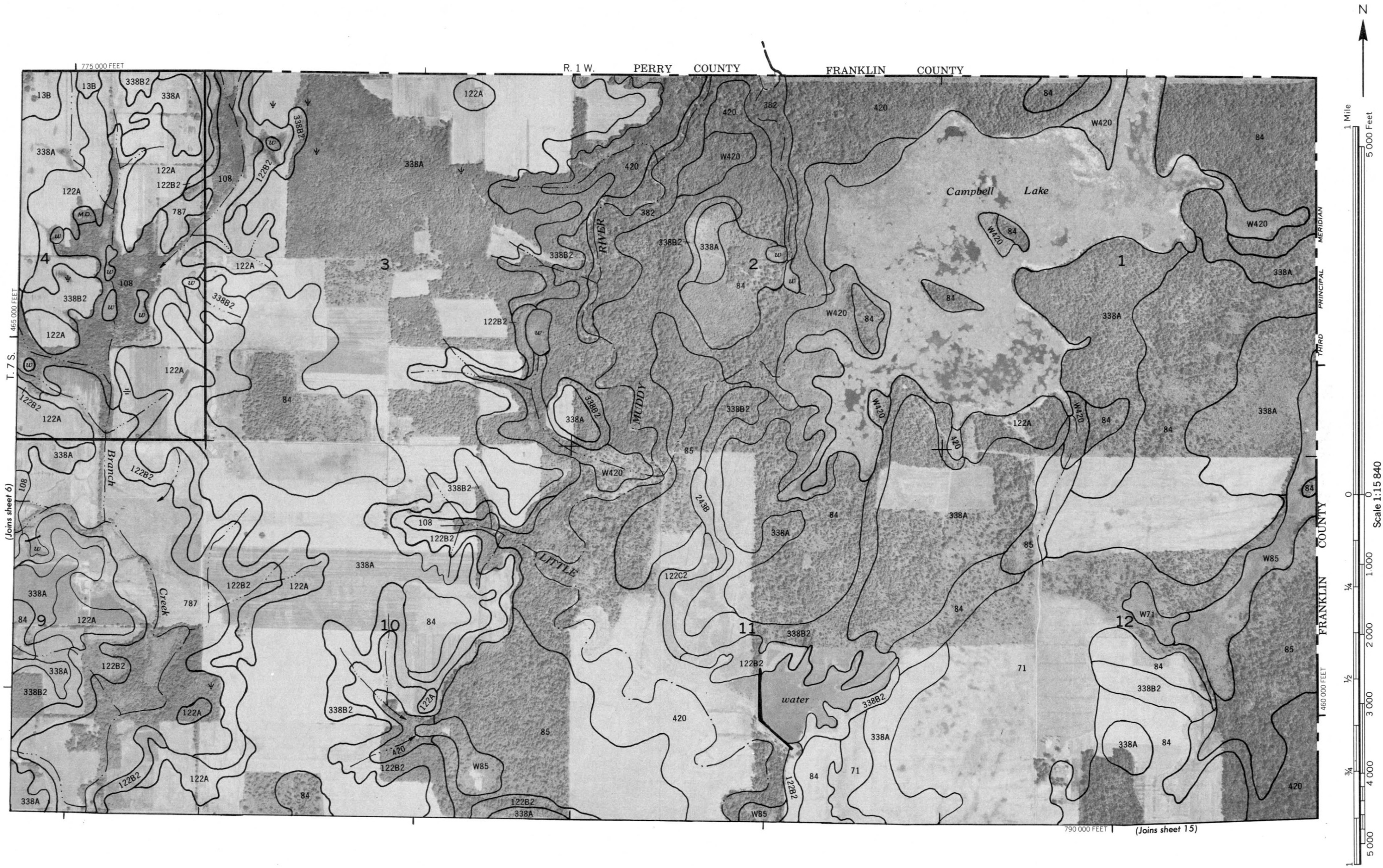
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



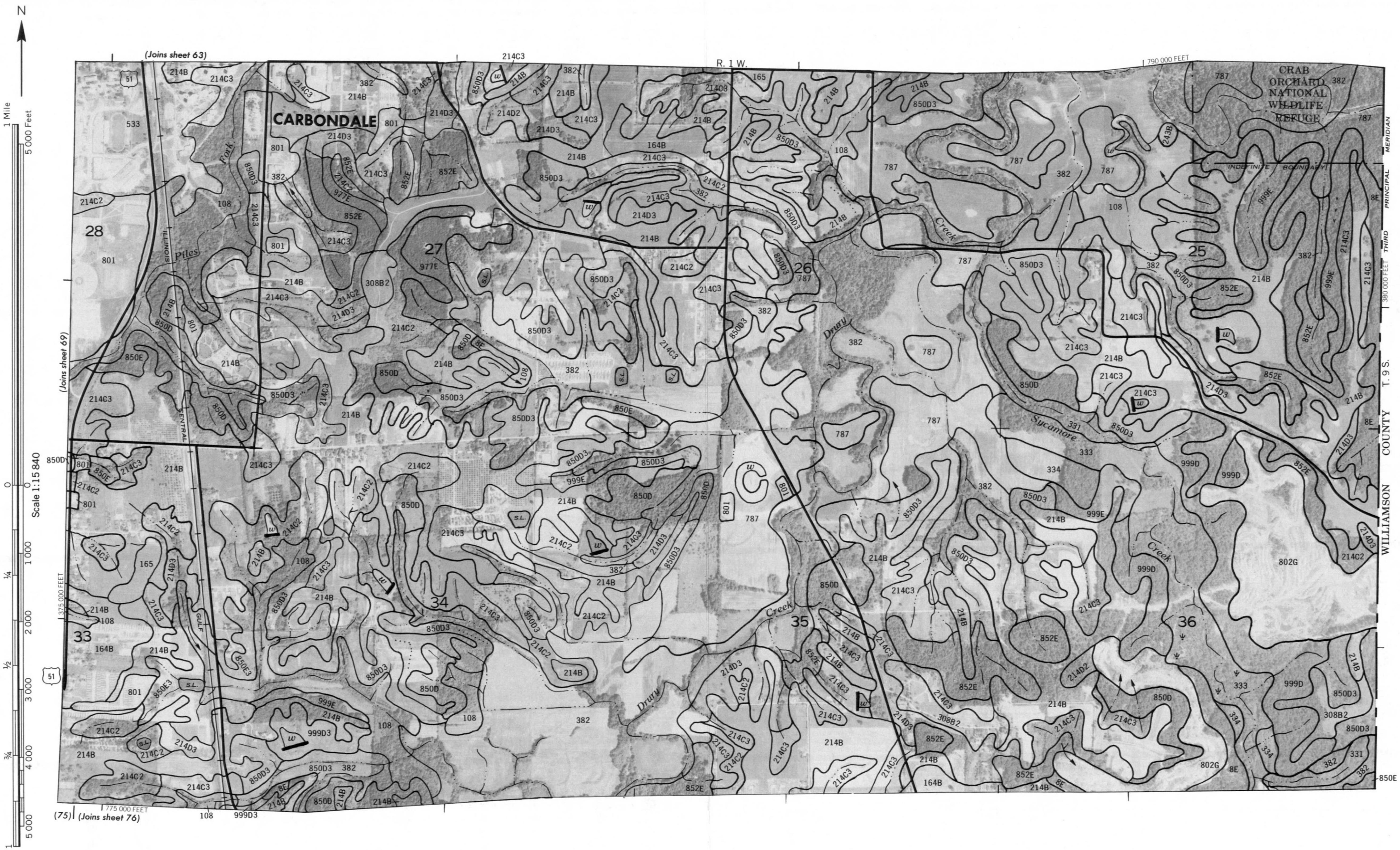
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



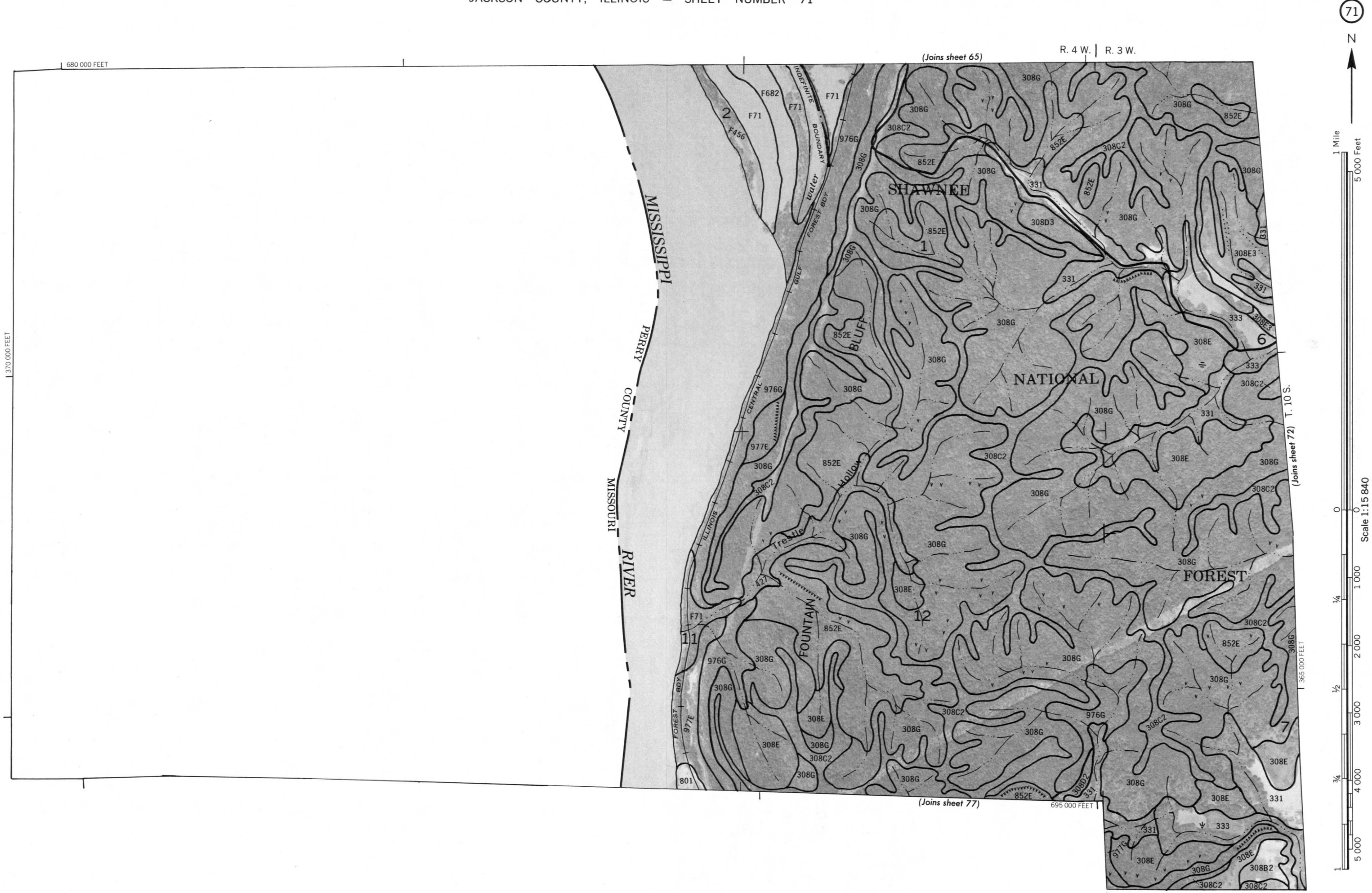
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



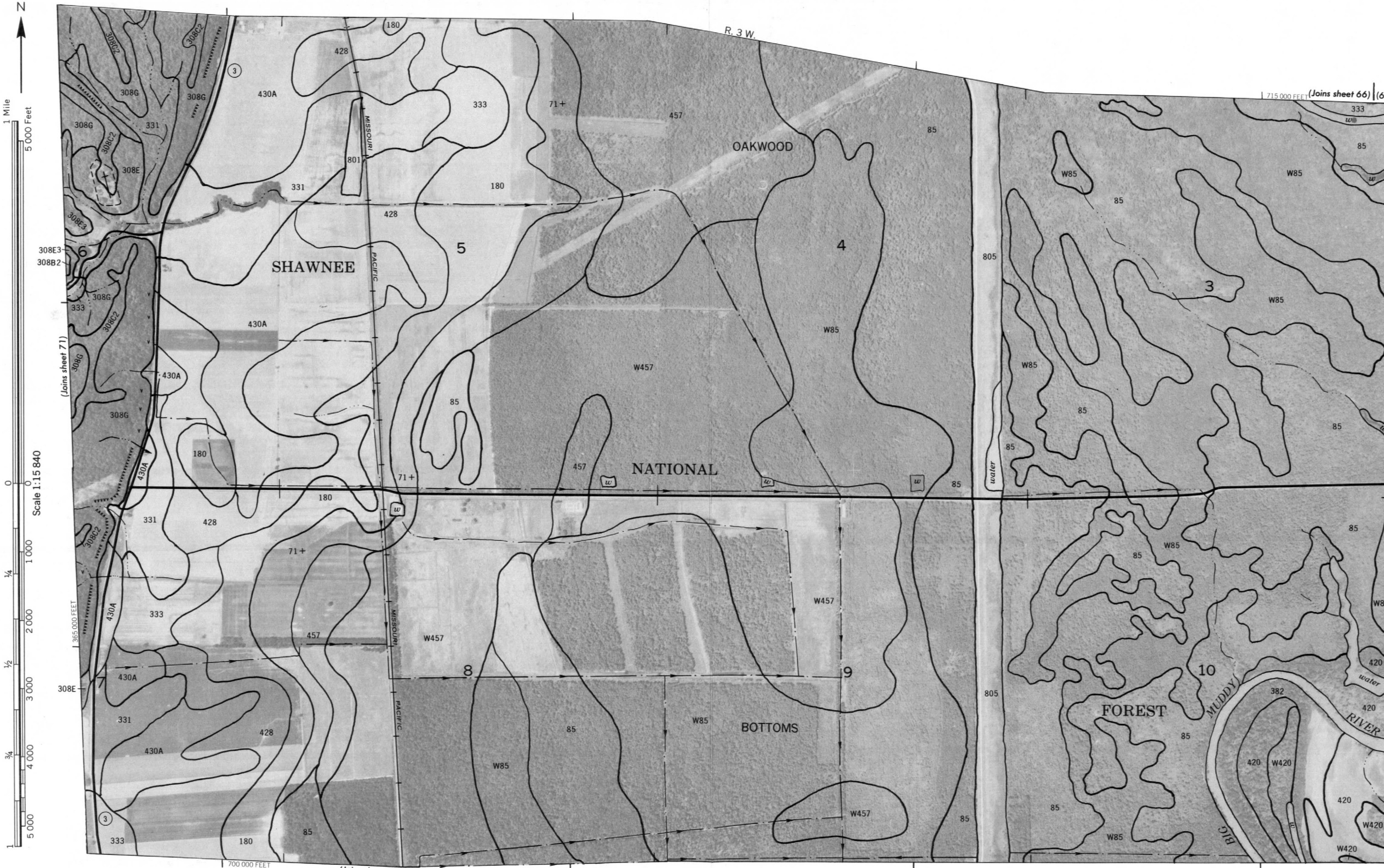
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



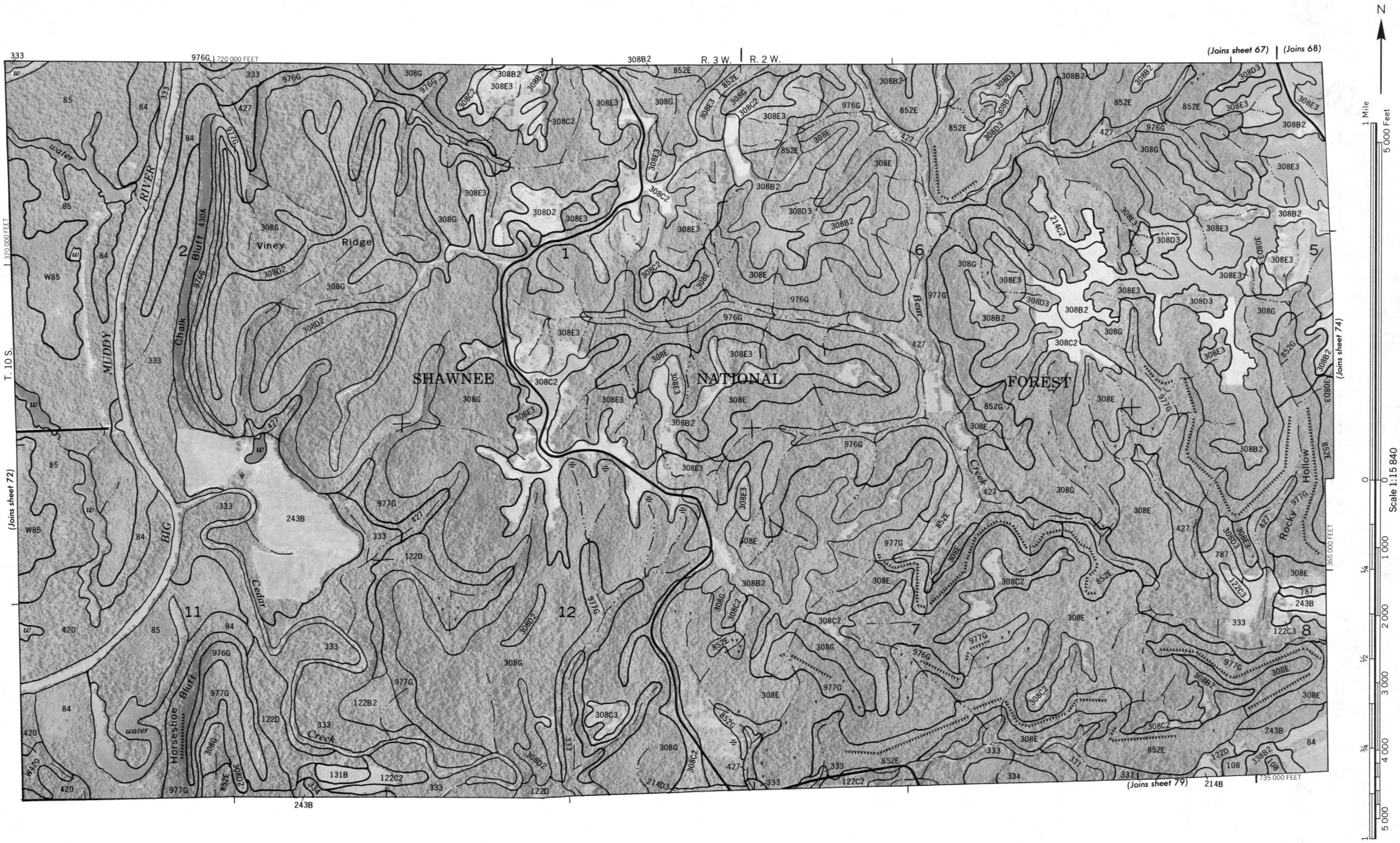
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


73
N
(Joins sheet 67)
(Joins sheet 68)
(Joins sheet 72)
(Joins sheet 74)
(Joins sheet 79)
R. 3 W.
R. 2 W.
T. 10 S.
720 000 FEET
370 000 FEET
365 000 FEET
735 000 FEET
SHAWNEE
NATIONAL
FOREST
BIG MUDDY RIVER
Chalk Bluff
Viney Ridge
Bear Creek
Cedar Creek
Horseshoe Bluff
Rocky Hollow
water
1
2
5
6
7
8
11
12
1 Mile
5 000 Feet
Scale 1:15 840
0
¼
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1 000
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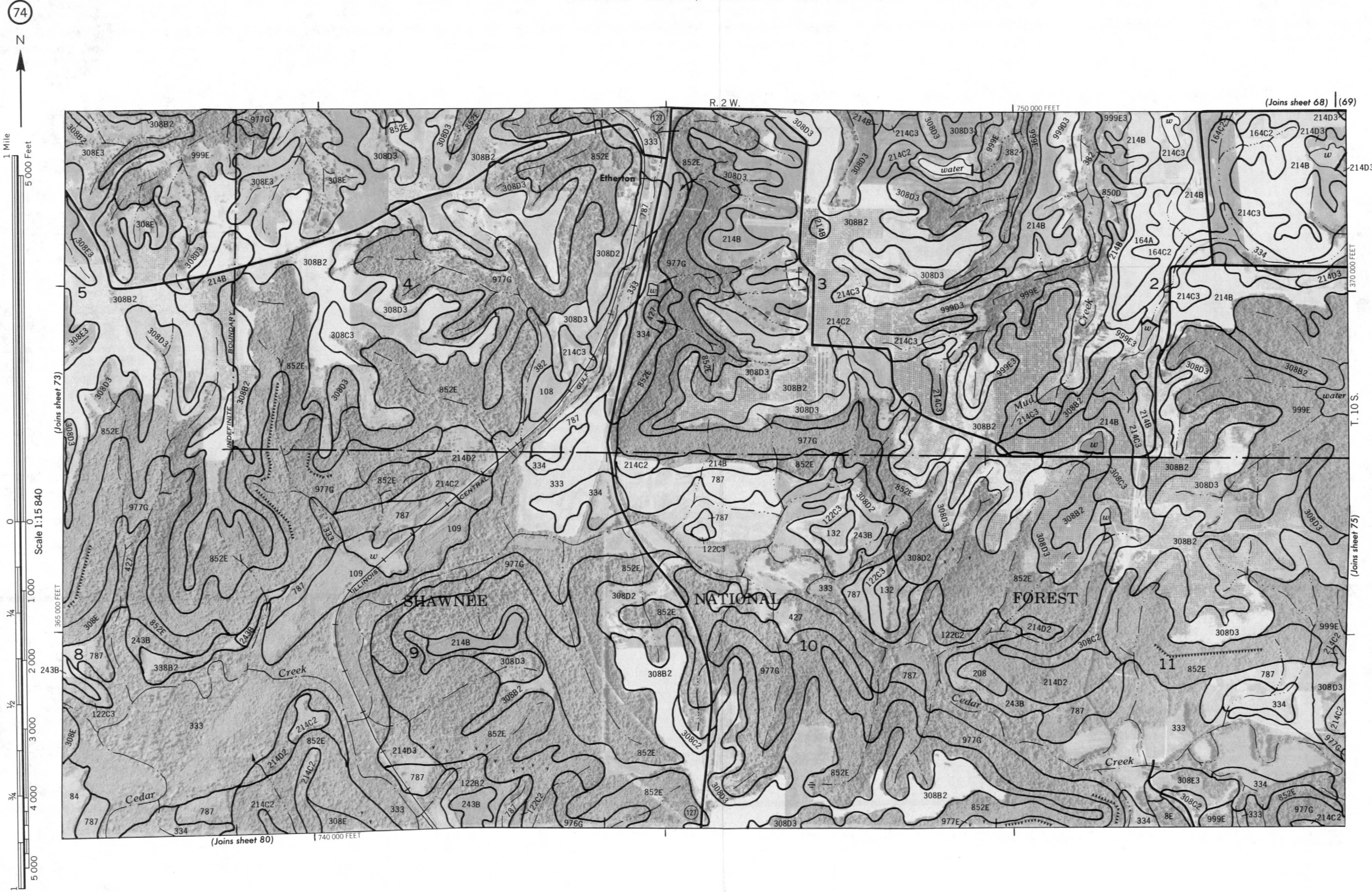

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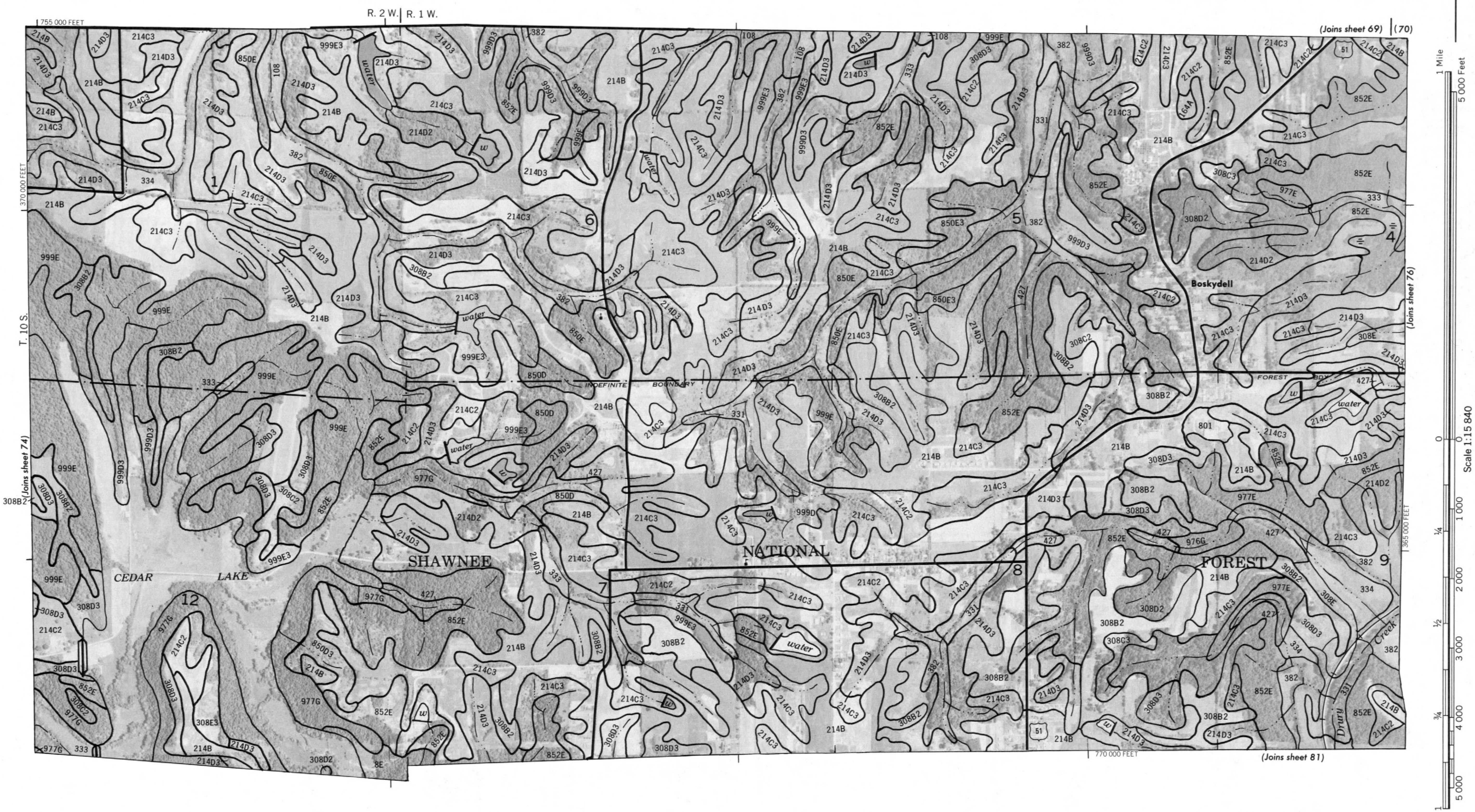
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

75



N
R. 2 W. | R. 1 W.
755 000 FEET
370 000 FEET
365 000 FEET
770 000 FEET
T. 10 S.
(Joins sheet 69) | (70)
(Joins sheet 74)
(Joins sheet 76)
(Joins sheet 81)
SHAWNEE
NATIONAL
FOREST
CEDAR
LAKE
Boskydell
INDEFINITE BOUNDARY
FOREST BDY
Drury Creek
water
1 Mile
5 000 Feet
Scale 1:15 840
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

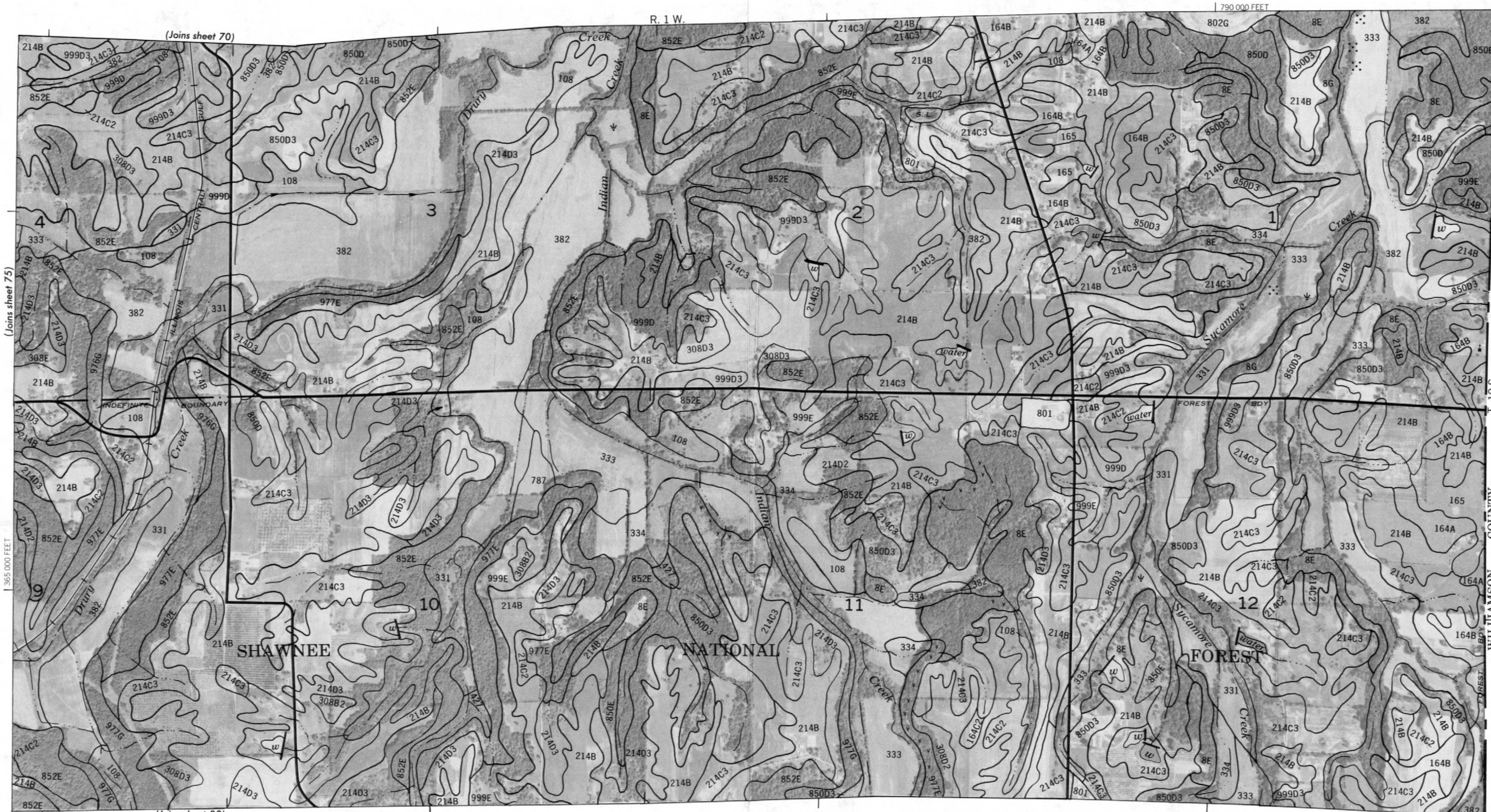
1 Mile

5 000 Feet

Scale 1:15 840

0 1 000 2 000 3 000 4 000 5 000

0 ¼ ½ ¾



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
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JACKSON COUNTY, ILLINOIS — SHEET NUMBER 78

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
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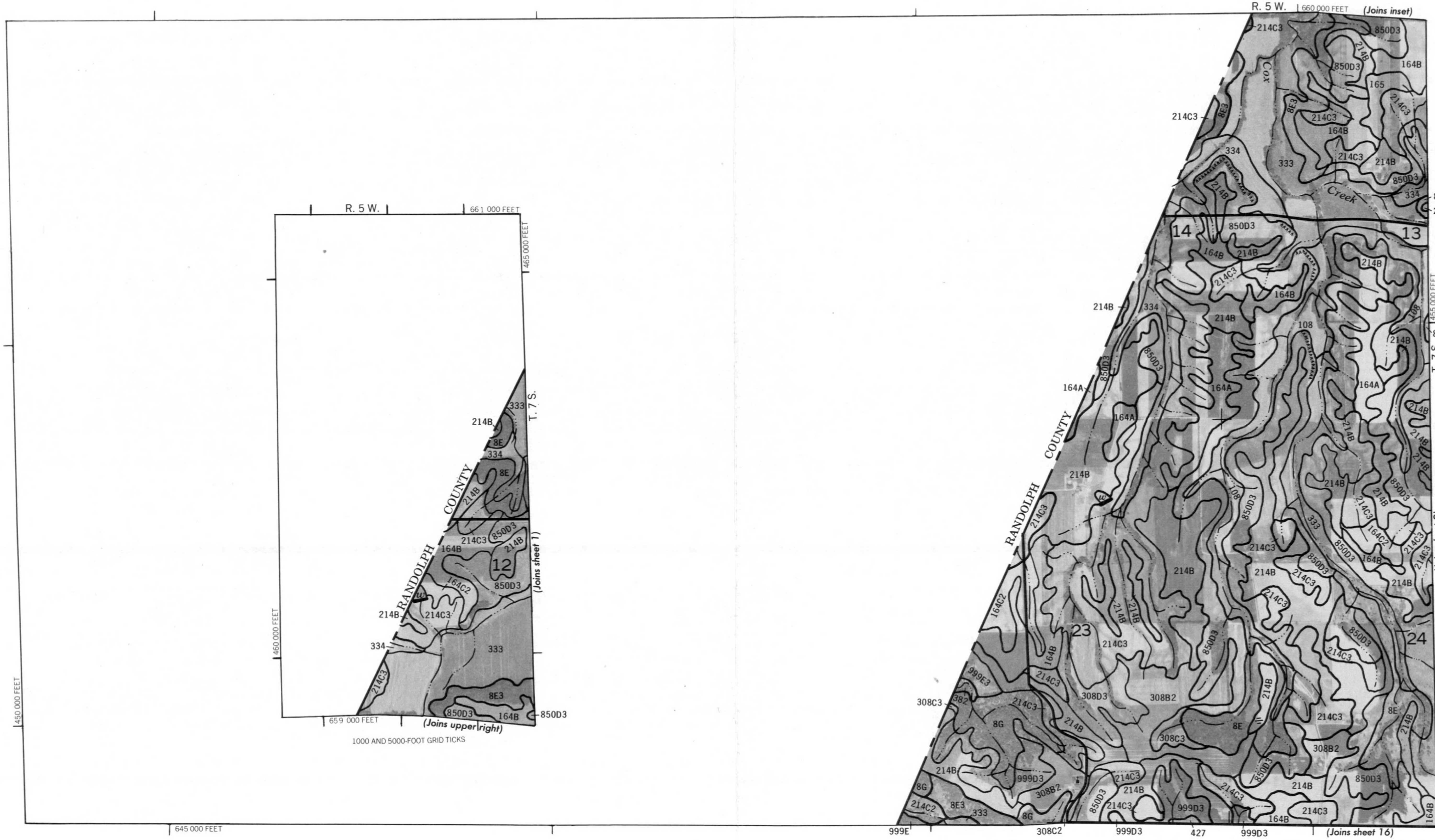
8

N



1 Mile

5 000 Feet

Scale 1:15 840

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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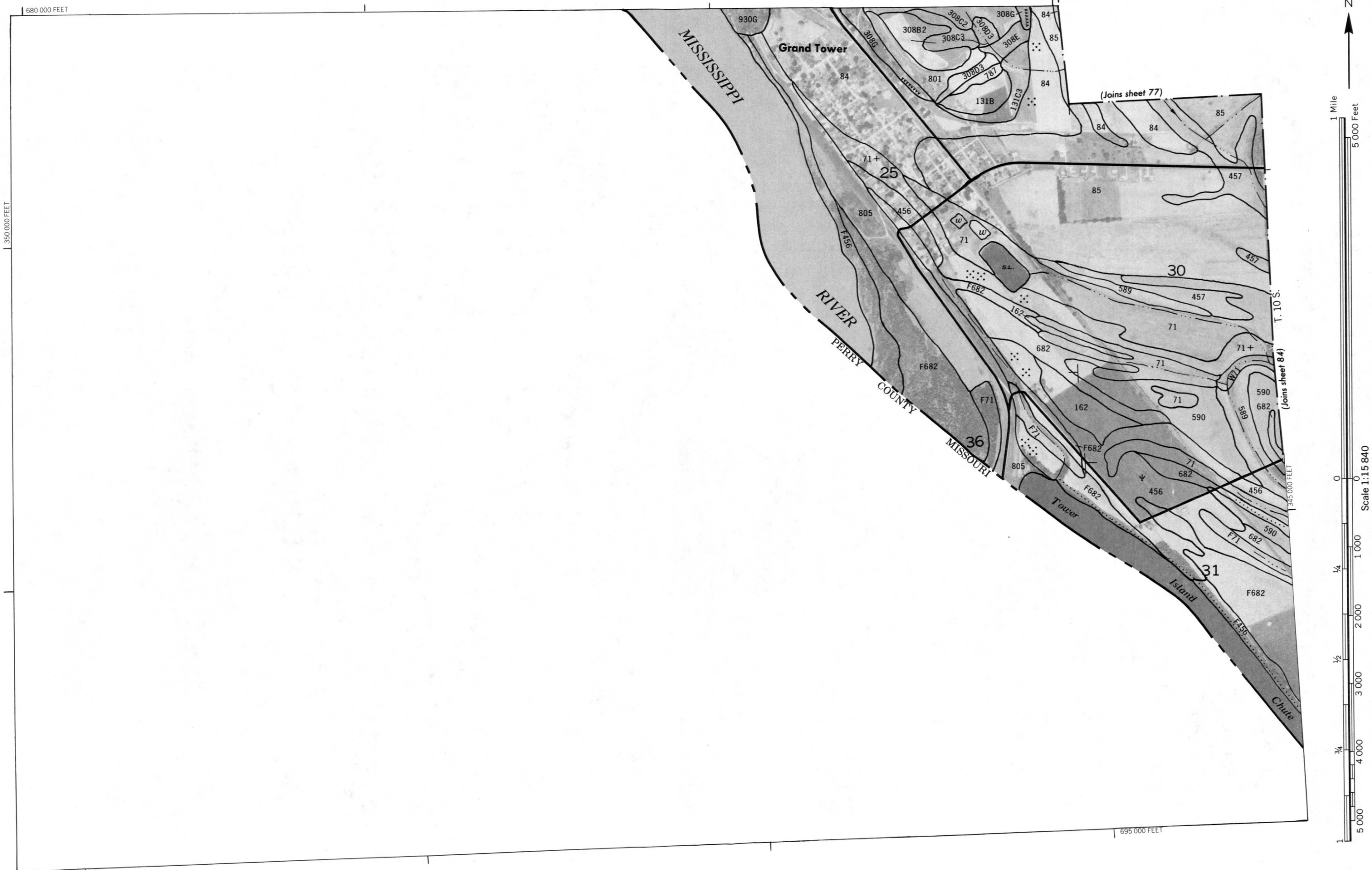

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
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84
N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 78)
R. 3 W.
715 000 FEET
350 000 FEET
345 000 FEET
(Joins sheet 83)
(Joins sheet 85)
(Joins sheet 90)
700 000 FEET
T. 10 S.
SHAWNEE
NATIONAL
FOREST
BIG
MUDDY
RIVER
Big
intermittent
Bayou
MISSOURI
PACIFIC
INDEFINITE
BOUNDARY
FOREST
BDY
water
Tower Island Chute
MISSOURI
UNION
COUNTY
30
29
28
27
31
32
33
34
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
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N

Scale 1:15 840

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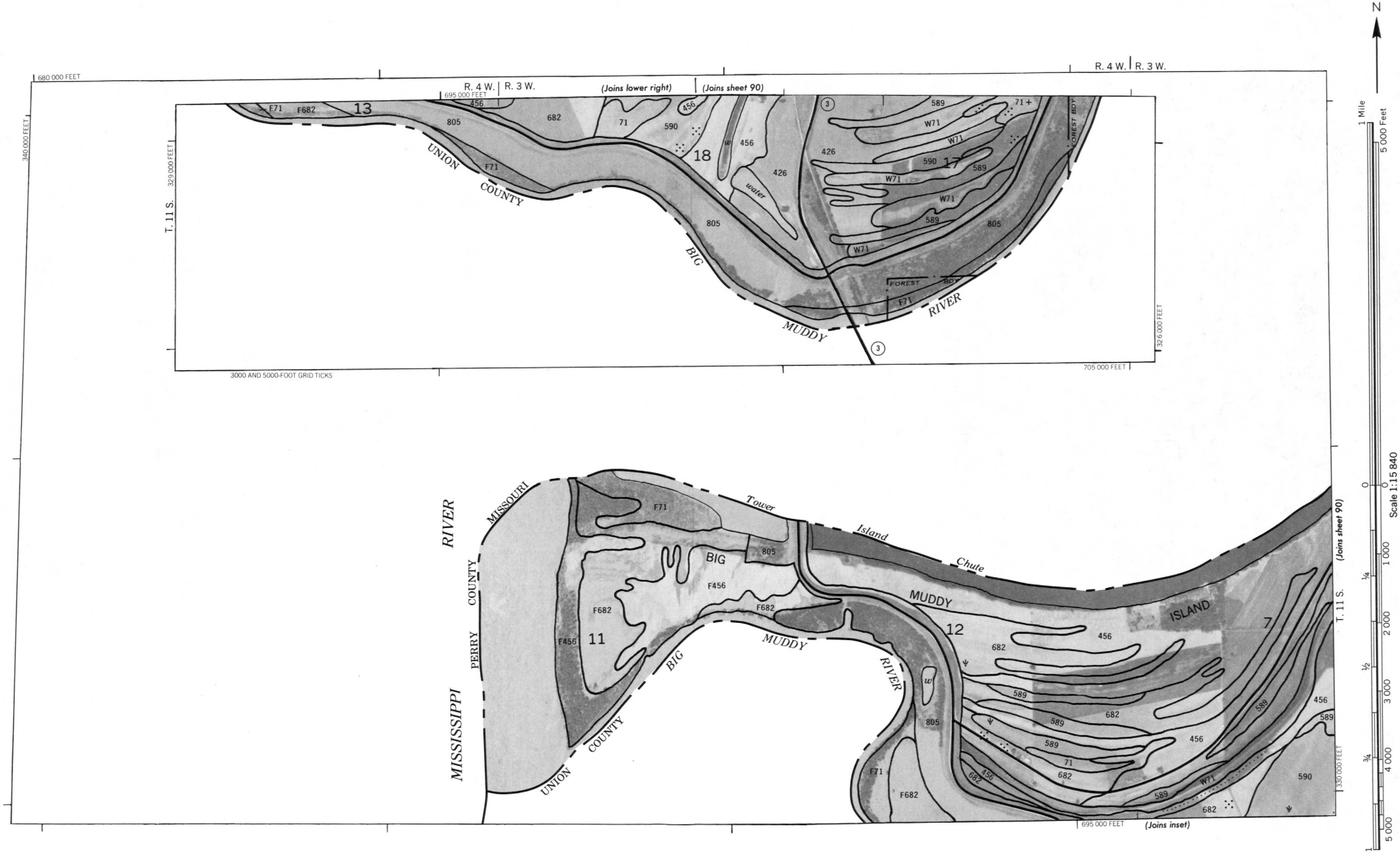
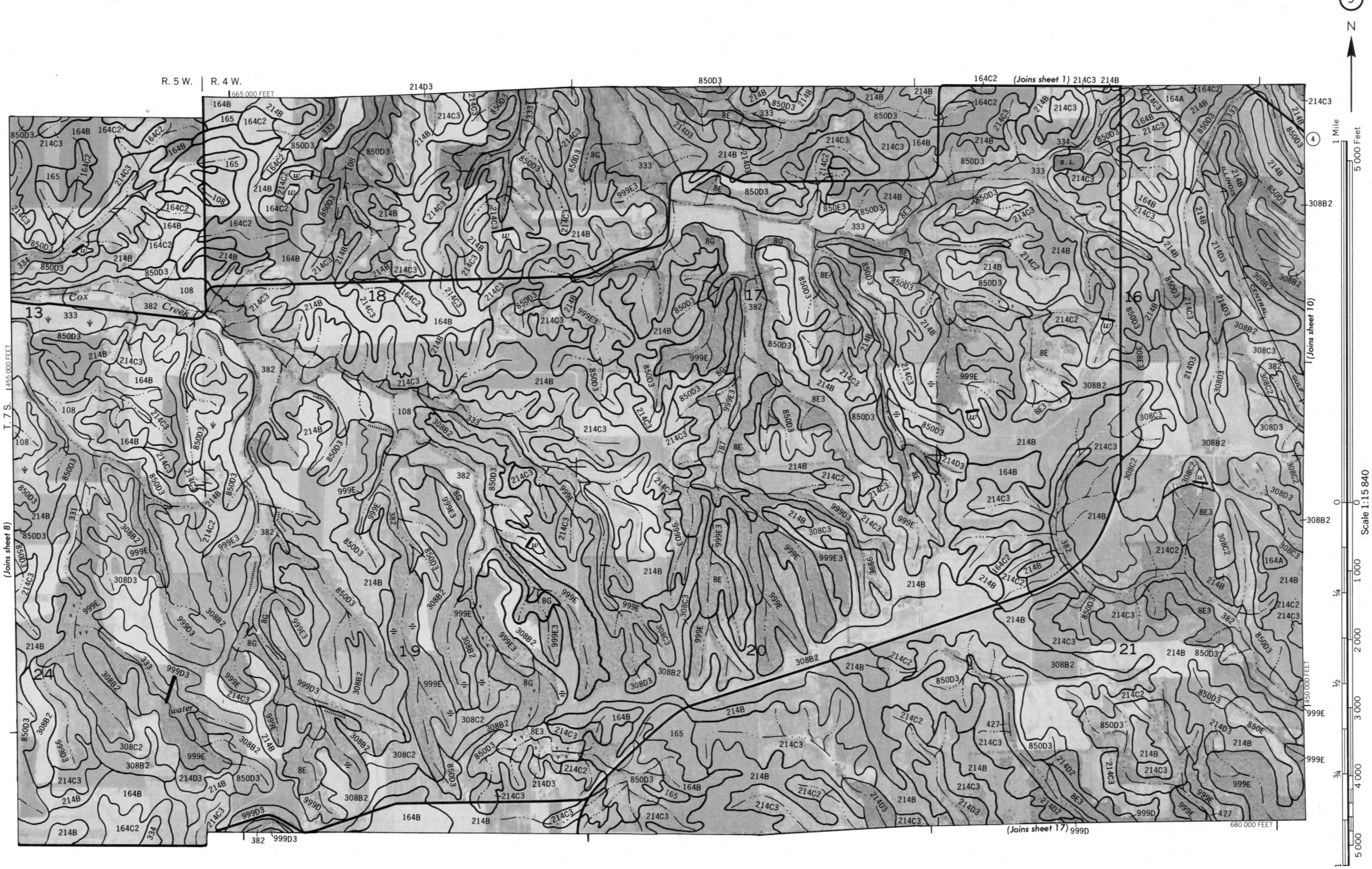


This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
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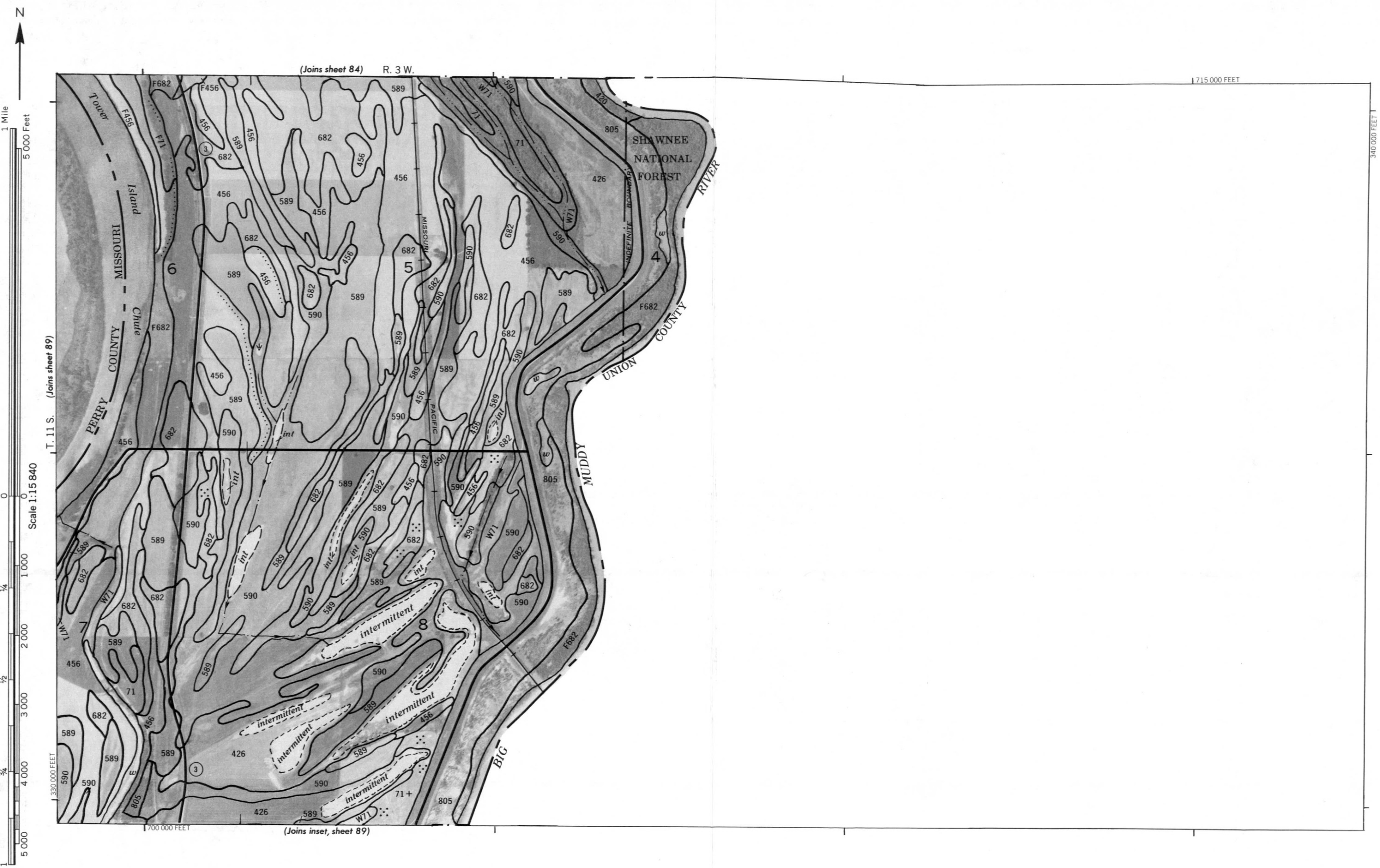

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.